AN ANNOTATED COMPENDIUM OF SPAWNING GROUND SURVEYS IN THE COLUMBIA RIVER BASIN ABOVE BONNEVILLE DAM, 1960-1984

Technical Report 86-1

Matthew Schwartzberg
Phillip B. Roger

March 1, 1986

Columbia River Inter-Tribal Fish Commission
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INTRODUCTION

This report has been written for three primary reasons: 1) to compile and publish spawning ground survey information for the Columbia basin above Bonneville Dam, an area frequently studied by fisheries managers and planners; 2) to clarify, annotate, and reconcile previously published spawning ground survey data; and 3) to use a computer for preparation and storage of the data in this report.

1. Data Collection and Reporting - Regional Perspective

In previous publications, collection and reporting of spawning ground surveys has generally been limited to specific production units, sub-regions, or state jurisdictional areas. Several published documents do exist that contain extensive Columbia basin-wide escapement information and they commonly include spawning ground survey data. This data, however, is gathered and presented from the perspective of particular planning and/or management issues, i.e. stocks (Horner and Bjornn 1981(a), Horner and Bjornn 1981(b), Horner and Bjornn 1981(c), Irving and Bjornn 1981, Mullan 1984, Howell et al 1985); or habitat based natural production potentials (Bryant 1949, Fulton 1968, Fulton 1970, PFMC 1979). In this report, recent and historic spawning ground surveys have been compiled for the principal tributaries of the Columbia River (above Bonneville Dam) for the time period of 1960 through 1984. To our knowledge, this amount of information has never been presented in a single document before.

2. Annotation and Reconciliation

The second purpose of this report is to clarify and, where possible, reconcile existing spawning ground escapement data. Spawning ground surveys in the Columbia basin have employed a variety of field methodologies. Much of this variation has depended on logistic factors specific to a sub-basin or stock and on management perspectives and subsequent research needs. In this report, an attempt has been made to describe survey methodologies for each production unit.

In many sub-basins, index areas have substantially changed over the 24 years covered in this report. Although this information is often excluded from other publications, it is essential to an understanding of relative levels of natural production. Therefore, we have tried, whenever possible, to link each spawning survey count (redds, fish, or carcasses) with the geographic area surveyed. In other cases, after careful reference to primary data sources, we have presented spawning survey information to reflect a common, annually consistent geographic area. This has been done in an attempt to create more comparable trend information. (These cases are footnoted to alert readers to data adjustments).

Other useful annotations have been included to indicate random yearly influences affecting surveys such as visibility, passage conditions, and electronic counting device malfunctions.

3. Computerized Format

Data in this report were prepared in retrievable, computer stored format. A single report structure was developed and the

material contained in this document can be easily revised and updated. File contents can also be transferred to computer data management systems to allow the application of a range of arithmetic processes.

METHODS - DATA SOURCES

Several sources were used for collection and reconciliation of the material in this report. The most important of these sources were those tribal, state, and federal biologists doing actual spawning ground survey field work. The majority of information used for annotations and attempted reconciliation of previously published data was provided by personal consultations with these individuals. Records of field survey notes were also investigated when available. Published and unpublished documents and internal correspondence of appropriate management entities provided the remainder of the data gathered.

Although an attempt was made to report information for the 1960-1984 time period, this was not always possible for earlier survey years because of non-existent, difficult to locate, or poor quality data.

SUMMARY OF RESULTS

This report contains tables of spawning ground survey data for 15 major sub-basins of the Columbia River above Bonneville Dam. These sub-basin tables are arranged into two sections. One section includes the tributaries of the mainstem Columbia, and the other, tributaries of the Snake River. Tables in each section are organized sequentially progressing upstream.

Separate tables exist for different major stocks of anadromous fish in each sub-basin. For certain production units, additional tables are provided to present data in alternate formats. For example, redd densities, in addition to index redd counts, are tabulated in some sub-basins where large fluctuations in index areas have occurred.

Tables are followed by extensive reference notes containing explanatory information and data sources consulted.

DISCUSSION

A draft version of this report was released in Fall, 1985 and comments have been recieved from all original contributors. These comments have been incorporated in the present document. Readers are asked to provide further corrections and suggested changes.

We recommend the regular update and revision of this document so that a useful reference for future regional spawning ground survey information can be created.

Research for this report has indicated there is little, if any, coordination in the spawning ground survey field methodologies and reporting procedures used throughout the Columbia basin. Different management entities employ a variety of techniques in the surveys and escapement estimates they make.

For example, in some sub-basins, numbers of live fish and carcasses are presently counted while in other streams, redd counts are made. The number of surveys made each year varies between sub-basins, ranging from one-time peak counts to sequential, cumulative weekly surveys. Geographic areas surveyed vary in different sub-basins from short index reaches to extensive surveys of total river spawning habitat. Individual tributaries are surveyed on foot in some years and from boat or aircraft in other years. Also, we encountered several cases of poor coordination between natural and artificial production planning where hatchery programs regularly introduce fish into or remove fish from areas that are used to index natural production levels. (Note that as a result of this project, one of the

authors has also made a brief analysis (Schwartzberg 1985) of the affect of survey timing on the accuracy of counts.)

There are biologic, stream-specific reasons why some sub-basins are surveyed in a particular way. Often, however, simply a lack of a coordinated approach has created the variety of investigative procedures that exists today.

Fisheries planners have given a great deal of recent attention to evaluating the Columbia basin as a whole system and not in the more traditional study units of the past -- regionally, by individual state, or sub-basin. Research and data collection methods supporting this basin-wide management perspective are now required.

To the extent that it is biologically prudent, spawning ground surveys should be redesigned. Some desirable changes are standardization of the timing and number of counts in sub-basins and throughout the Columbia system, establishment of representative index areas and calibration of these areas to total sub-basin spawning levels (possibly using weir or other high accuracy count techniques), and establishment of uniform field methods and reporting techniques. Development of these procedures will supplement such tasks as determination of present and potential production capacities, monitoring of the performance of existing and proposed habitat improvement projects, and in the development of reliable data input parameters for systems modeling experiments.

We recommend that research be initiated to create a standardized spawning ground survey system for application throughout the Columbia basin.

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SUB-BASIN DATA AND REFERENCE NOTES

WIND RIVER

SPRING CHINOOK FISH COUNTS IN THE WIND BASIN[a]

SPAWNING YEAR	FISH COUNTED[b]	MILES SURVEYED[c]	FISH/MILE
1970	126	10.5	12
1971	1176	10.5	112
1972	557	10.5	53
1973	95	10.5	9
1974	42	10.5	4
1975	42	10.5	4
1976	63	10.5	6
1977	42[d]	8.8	5[d]
1978	81	7.0	12
1979	N.S.	N.S.	N.S.
1980	46	8.5	5
1981	N.S.	N.S.	N.S.
1982	26	4.0	7
1983	117	8.6	21
1984	141	8.6	16

NOTES

a. Sources: Hugh Fiscus and Wolf Dammers, Washington Department of Fisheries (WDF), personal communications and WDF field survey notes; and Fiscus, H. 1985. Salmon Escapement Data for Columbia River Production Areas in Washington, WDF internal correspondence.

The natural spawning population of spring chinook in the Wind River is largely composed of hatchery strays from the U.S. Fish and Wildlife Service's Carson Hatchery.

Surveys are one-time peak counts.

Spring chinook spawning ground surveys in the Wind River are made on foot.

b. In the Wind River, WDF considers fish counts to be much more accurate than redd counts and, although redd counts are also made, they are not reported here.

Live fish counts and carcass counts are combined.

c. Present index: Paradise to Beaver Campground (8.6 mi.) Index area mileage has varied from 1970 through the present. See chart for mileage changes.

d. Poor visibility.

FALL CHINOOK FISH COUNTS IN THE WIND BASIN[a]

SPAWNING YEAR	FISH COUNTED[b]	MILES SURVEYED[c]	FISH/MILE
1960	117	0.9	130
1961	173	0.9	192
1962	204	0.9	227
1963	276	0.9	307
1964	198	0.9	220
1965	131	0.9	146
1966	267	0.9	297
1967	76	0.9	84
1968	53	0.4	133
1969	4	0.4	10
1970	11	0.4	28
1971	368[d]	0.4[d]	920[d]
1972	342	1.3	263
1973	135[d]	1.3[d]	104[d]
1974	169	1.3	130
1975	159	1.3	122
1976	179	1.3	138
1977	269	1.3	207
1978	423	1.3	325
1979	262[d]	1.3[d]	202[d]
1980	111[d]	1.3[d]	85[d]
1981	71	1.3	55
1982	101	1.3	78
1983	137	1.3	105
1984	37	1.3	28

NOTES

a. Sources: Hugh Fiscus and Wolf Dammers, Washington Department of Fisheries (WDF), personal communications; WDF field survey notes; and Fiscus, H. 1985. Salmon Escapement Data for Columbia River Production Areas in Washington, WDF internal correspondence.

Surveys are one-time peak index counts.

Spawning ground surveys for fall chinook in the Wind River are either made on foot or from drift boat.

The natural spawning population of Wind River Fall Chinook is composed of hatchery strays from Bonneville Pool Hatchery sources and of a natural stock component.

b. In the Wind River, WDF considers fish counts to be much more accurate than redd counts and, although redd counts are made in this basin, they are not reported here.

c. Index areas:

1960 through 1967	---	Shippard Falls to the Little Wind River.
1968 through 1971	---	Little Wind River to the Wind River mouth.
1972 through 1984	---	Shippard Falls to the Wind River mouth.

From 1968 through the present, there has been a small variation in the lower boundary of the index (Wind River mouth area). The 'miles surveyed' data has not been adjusted to account for these fluctuations in index mileage. Only a small amount of spawning occurs in this area and these changes in index boundaries probably have had little impact on fish counts.

d. In 1971, 1973, 1979, and 1980, two separate surveys were made in the same index area. The count reported on the above chart is the greater of the two.

BIG WHITE SALMON RIVER

FALL CHINOOK FISH COUNTS IN THE BIG WHITE SALMON BASIN[a]

SPAWNING YEAR	FISH COUNTED[b]	MILES SURVEYED[c]	FISH/MILE
1965	553	2.0	275
1966	974	2.0	474
1967	541	2.0	271
1968	109[d]	2.0	55[d]
1969	1036	2.0	518
1970	248	2.0	124
1971	203	2.0	102
1972	157[e]	2.0	79[e]
1973	336	2.0	168
1974	328	2.0	164
1975	706	2.0	353
1976	767	2.0	384
1977	86[f]	2.0	43[f]
1978	395	2.0	198
1979	154	2.0	77
1980	297[d]	2.0	149[d]
1981	275	2.0	138
1982	587[g]	2.0	294[g]
1983	104	2.0	52
1984	N.S.	N.S.	N.S.

NOTES

a. Sources: Hugh Fiscus and Wolf Dammers, Washington Department of Fisheries (WDF), personal communications; WDF field survey notes; and Fiscus, H. 1985. Salmon Escapement Data for Columbia River Production Areas in Washington, WDF internal correspondence.

b. In the Big White Salmon River, fish counts are considered much more accurate than redd counts by WDF and, although redd counts are made, they are not reported here.

Live fish counts and carcass counts are combined.

c. Present index area: Condit Dam to Mouth (2.Ø).
Index area has remained constant from 1965 through the present.

d. Poor visibility.

e. Late survey; poor visibility. Few carcasses found.

f. In 1977, illegal set netting occurred just below river mouth.

g. Peak count was adjusted to compensate for Spring Creek Hatchery carcasses dumped into the Big White Salmon River two weeks before survey. The actual live fish plus carcass count was 1769.

KLICKITAT RIVER

SPRING CHINOOK REDD AND FISH COUNTS IN THE KLICKITAT BASIN[a]

SPAWNING YEAR	Above Castile Falls			Below Castile Falls		
	REDDS	FISH[b]	MILES SURVEYED	REDDS	FISH[b]	MILES SURVEYED
1960	N.S.	N.S.	N.S.	N.S.	52	2.0
1961	N.S.	6	6.0	N.S.	102	2.0
1962	N.S.	7	6.0	N.S.	10	1.5
1963	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1964	N.S.	N.S.	N.S.	N.S.	55	2.0
1965	N.S.	N.S.	N.S.	N.S.	36	1.5
1966	N.S.	12	12.0	N.S.	99	2.0
1967	N.S.	6	6.0	N.S.	6	2.0
1968	N.S.	5	6.0	N.S.	18	2.0
1969	N.S.	17	18.0	N.S.	10	1.5
1970	N.S.	20	18.0	N.S.	88	2.0
1971	13	6	18.0	23[c]	12[c]	4.0
1972	N.S.	24	18.0	N.S.	38	1.6
1973	5	6	18.0	33	32	1.6
1974	N.S.	8	18.0	N.S.	18	1.6
1975	8	4	18.0	12	28	1.6
1976	0	0	18.0	9	24	3.5
1977	1	0[d]	18.0	N.S.	N.S.	N.S.
1978	4	4	18.0	30	9	3.5
1979	1	1	18.0	2[d]	7[d]	3.5
1980	1	1	4.9	9	2	1.5
1981[e]	0	1	18.0	35	18	3.5
1982[e]	0	1	3.5	8	9	3.5
1983	N.S.	N.S.	N.S.	8	1	2.4
1984[f]	N.S.	N.S.	N.S.	2[f]	0[f]	3.5

NOTES

a. Source: Eric Barth, Confederated Tribes and Bands of the Yakima Indian Nation (YIN), and Hugh Fiscus, Washington Department of Fisheries (WDF) personal communications.

Before 1980, data was collected by WDF with the assistance of the U.S. Fish and Wildlife Service (USFWS) and the YIN. Since 1980, YIN has been the primary data collector.

Surveys are one-time peak counts usually made on August 28.

b. Includes carcasses.

c. Poor visibility below West Fork.

d. Poor visibility.

e. Additional surveys were made by YIN below Signal Peak Bridge in 1981 and 1982. In 1981, the three miles between Castile Falls and Signal Peak Bridge yielded 33 redds and the 17 mile section from Signal Peak Bridge and the Klickitat Hatchery contained two redds. In 1982, eight and 10 redds were found in these areas respectively.

f. Late survey (October). Unreliable count.

FALL CHINOOK FISH COUNTS IN THE KLICKITAT BASIN[a]

SPAWNING YEAR	FISH COUNTED[b]	MILES SURVEYED[c]	FISH/MILE
1964	1041	13.9	75
1965	838	25.0	34
1966	354[d]	30.0	12[d]
1967	475	13.9	34
1968	605	13.9	44
1969	531[d]	13.9	38[d]
1970	127	13.9	9
1971	68	13.9	5
1972	141	13.9	10
1973	64	13.9	5
1974	18	13.9	1
1975	64	13.9	5
1976	51	13.9	4
1977	7	13.9	0
1978	18	13.9	1
1979	9[d]	13.9	0[d]
1980	103	13.9	7
1981	107	13.9	8
1982	157	23.3	7
1983	33[d]	23.3	1[d]
1984	55	23.3	2

NOTES

a. Sources: Hugh Fiscus and Wolf Dammers, Washington Department of Fisheries (WDF); Eric Barth, Confederated Tribes and Bands of the Yakima Indian Nation (YIN), personal communications; Fiscus, H. 1985. Salmon Escapement Data for Columbia River Production Areas in Washington, WDF internal correspondence; and Norman, G. 1982. Population Estimates of Natural Spawning Adult and Jack Fall Chinook Salmon on the Wind, Big White Salmon and Klickitat Rivers, 1964-1984.

The natural spawning population of fall chinook in the Klickitat River is composed of adult returns from Klickitat Hatchery releases (Spring Creek stock) and a natural stock component largely made up of previous Klickitat Hatchery releases.

Surveys are one-time peak index counts usually made during the first week of October.

Spawning ground surveys for fall chinook in the Klickitat River are made from rafts or drift boats.

b. In the Klickitat River, WDF considers fish counts much more accurate than redd counts for fall chinook, and although redd counts are made, they will not be reported here.

Live fish counts and carcass counts are combined.

c. Present index: Hatchery to Twin Bridges (23.3 mi.).
The historic index area has been Lydel to Twin Bridges (13.9 mi.). Although a larger area was surveyed in 1967, and from 1974 through 1981, for comparative purposes only the 13.9 mi. index is reported here.

Other Index Areas

1965 and 1966 -- Lydel to Goat Ranch Access area (25.Ø, 3Ø.Ø mi.).
1982 through 1984 -- Hatchery to Twin Bridges (23.3 mi.).

d. Poor visibility.

DESCHUTES RIVER

SPRING CHINOOK REDD COUNTS IN THE DESCHUTES BASIN[a]

Index stream mileage is in parentheses[b]

SPAWNING YEAR	WARM SPRINGS RIVER[d]				BEAVER CREEK[g]			
	BUNCHGRASS TO SCHOOLIE[c,d] (4.0)	SCHOOLIE TO BADGER CR.[d] (9.0)[d]	HATCHERY TO CULPUS BR.[d] (5.0)[d]	TOTAL WARM SPRINGS R.	ROBINSON PARK TO CANYON[g] (5.0)[g]	OLD SHIMNASHO BR. TO NEW SHIMNASHO BR.[g] (0.4)[g]	NEW SHIMNASHO BR. TO BEAVER CR. MOUTH[g] (7.1)[g]	TOTAL BEAVER CR.
1975[e]				560[e]				162[e]
1976[e]				834[e]				161[e]
1977[e,f]				591[e,f]				73[e,h]
1978	216	404[d]	8[d]	628	101[g]	-----18[g]-----		119
1979	147	106[d]	2[d]	255	88[g]	------9[g]-----		97
1980	36	45[d]	3[d]	84	16[g]	------6[g]-----		22
1981	48	83[d]	10[d]	141	4[g]	------5[g]-----		9
1982	140	169[d]	12[d]	321	38[g]	-----34[g]-----		72
1983	112	175	5	292	83	7	14	104
1984	93	146	14	253	98	0	48	146

SPRING CHINOOK REDD COUNTS IN THE DESCHUTES BASIN[a]

Index stream mileage is in parentheses[b]

SPAWNING YEAR	MILL CREEK[i]				SHITIKE CREEK[l]				
	B241 BR. TO B244 BR. (1.75)	STRAWBERRY FALLS TO POTTER'S POND i,j (1.0)	POTTER'S POND TO CANYON i (2.0)	TOTAL MILL CREEK	UPPER CROSSING TO OLD BENNETT PLACE[l] (2.75)	OLD BENNETT PLACE TO HEADWORKS[l] (1.7)	HEADWORKS TO SHAKER CHURCH[l] (2.75)[l]	SHAKER CHURCH TO MOUTH[l] (2.75)[l]	TOTAL SHITIKE CR.
1975[e]				86[e]					Ø[e]
1976[e]				77[e]					Ø[e]
1977[e,j]				35[e,k]			3[l]		
1978	N.S.	N.S.	49	49	N.S.	2	-----13[l]-----		5
1979	N.S.	N.S.	7	7	N.S.	1	------2[l]-----		3
1980	N.S.	1	5	6	N.S.	Ø	-----14[l]-----		14
1981	N.S.	2	5	7	N.S.	Ø	------6[l]-----		6
1982	15	11	14	40	N.S.	N.S.	-----16[l]-----		16
1983	3	15	7	25	2	4	8	1	15
1984	16	5	9	30	10	6	2	3	21

NOTES

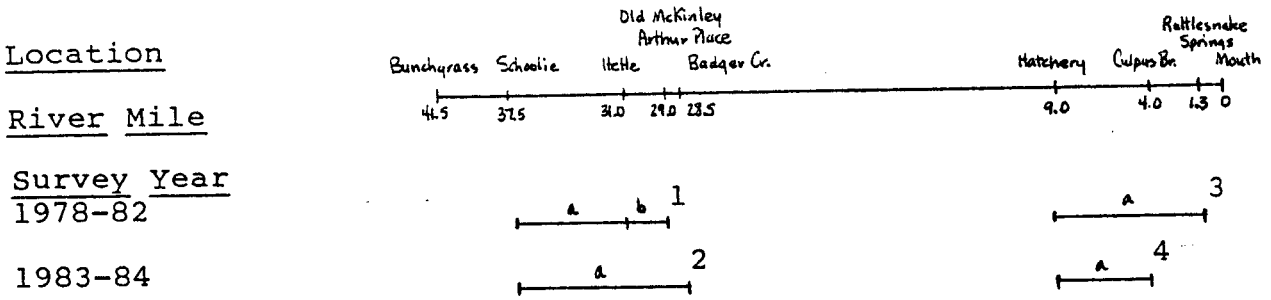
a. Sources: Cris Stainbrook and Louie Pitt Jr., Biologists, Confederated Tribes of the Warm Springs Reservation, personal communications; and Warm Springs Indian Reservation Anadromous Fish Study, prepared by CH2M Hill, January, 1982.

Surveys are made twice during each spawning season. Redd counts reported are cumulative. Redds counted in the first survey are marked to avoid double counting.

b. For exceptions and explanatory information, see footnotes below.

c. This index is surveyed on foot.

d. Because of the complexity of index area changes, and to show the level of comparability between historic and present surveys in this index, the following diagram (drawn to scale) of the Warm Springs River is provided:



1. 1978 through 1982 - 2 index sections:
   a. Schoolie to HeHe
   b. HeHe to Old McKinley Arthur Place

2. 1983 through the present - 1 index section:
   a. Schoolie to Badger Creek

3. 1978 through 1982 - 1 index section:
   a. Hatchery to Rattlesnake Springs

4. 1982 through the present - 1 index section:
   a. Hatchery to Culpus Bridge

Counts have been combined in the main chart to make index areas relatively comparable.

Note:

1) 1978 through 1982 surveys in present 'Schoolie to Badger Creek' index are Ø.5 mi. longer than subsequent surveys.

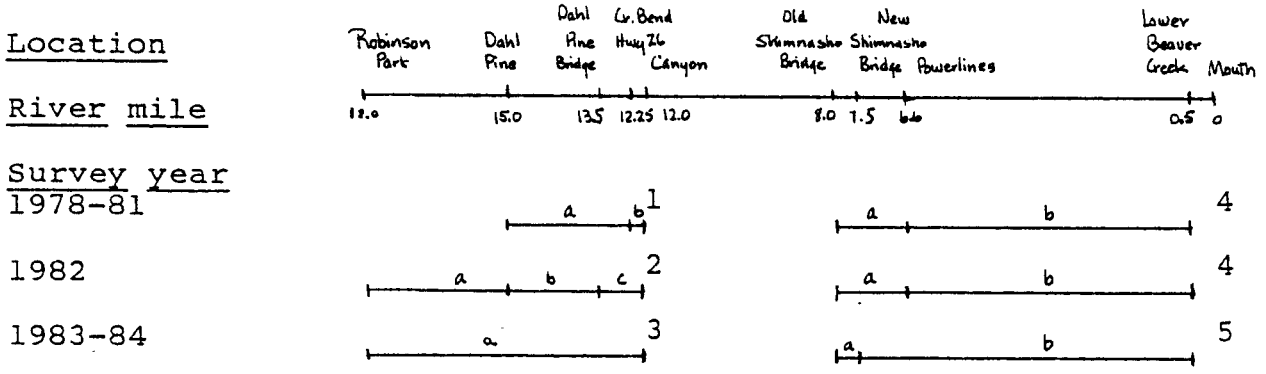
2) 1978 through 1982 surveys in 'Hatchery to Rattlesnake Springs' index were 8.7 mi. longer than subsequent surveys in present 'Hatchery to Culpus Bridge' index. However, only a minor amount of spawning activity is known to occur in this 8.7 miles of habitat.

Mainstem Warm Springs River surveys are made from rafts.

e. No breakdown by index area is known for these years.

f. The only breakdown by index area known for the Warm Springs River in 1977 is '201 redds counted below Hatchery, 390 above' (CH2M Hill study). Also, see note "d" above.

g. Because of the complexity of index area changes, the following diagram (drawn to scale) of Beaver Creek is provided:



1. 1978 through 1981- 2 index sections:
   a. Dahl Pine to Bend of Creek at Highway 26
   b. Bend of Creek at Highway 26 to Canyon

2. 1982 through 1983- separate index sections:
   a. Robinson Park to Dahl Pine
   b. Dahl Pine to Dahl Pine Bridge
   c. Dahl Pine Bridge to Canyon

3) 1983 through the present - 1 index section:
   a. Robinson Park to Canyon

4) 1978 through 1982 - 2 index sections:
   a. Old Shimnasho Bridge to Powerlines
   b. Powerlines to Lower Beaver Creek

5) 1983 through the present - 2 index sections:
   a. Old Shimnasho Bridge to New Shimnasho Bridge
   b. New Shimnasho Bridge to Lower Beaver Creek

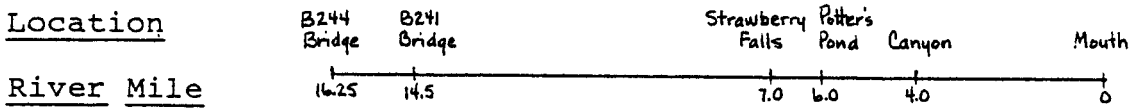
Counts have been combined on the chart to make index areas relatively comparable.

Note that 1978 through 1981 surveys in present Robinson Park to Canyon index were 3.Ø mi. shorter than subsequent surveys.

Beaver Creek is surveyed on foot.

h. The only breakdown by index area known for Beaver Creek in 1977 is 73 redds counted below Dahl Pine (CH2M Hill study). It is not known how far below Dahl Pine survey extended. See note "g" above.

i. Following is a diagram (drawn to scale) of the index areas of Mill Creek.



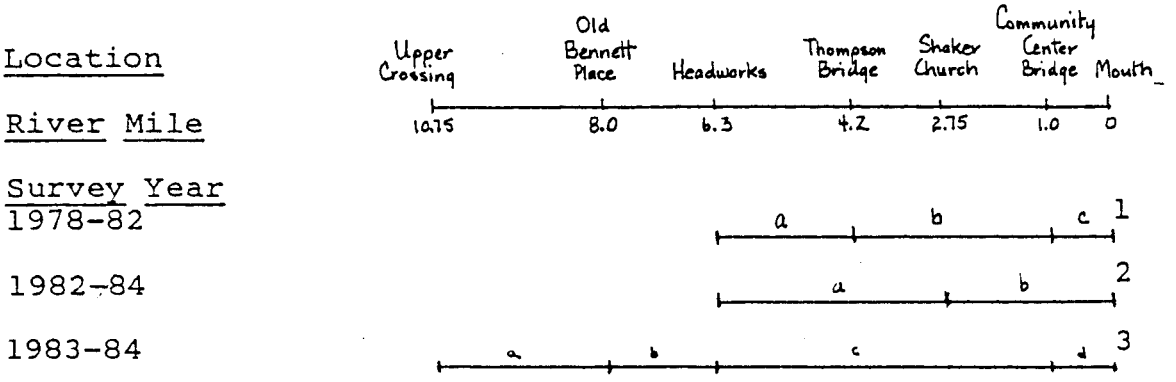
Surveys on Mill Creek are made on foot.

j. A log pond dam at Potter's Pond washed out in 198Ø opening up new spawning areas. Surveys in the 'B244 Bridge to B241 Bridge' and the 'Strawberry Falls to Potter's Pond' index were begun in 198Ø.

The B-241 area was planted in 1982 with 47 adult spring chinook brought from the Warm Springs National Fish Hatchery and released on August 14. 19 female and 21 male hatchery stock fish and 5 female and 4 male natural stock fish were released.

k. The only breakdown known for Mill Creek in 1977 is that 'survey was below Potter's Pond' (CH2M Hill study). It is not known how far below Potter's Pond survey extended. See note "i" above.

1. Because of the complexity of index area changes, and to show the level of comparability between historic and present surveys, the following diagram (drawn to scale) of Shitike Creek is provided:



1. 1978 through 1982 - 3 index sections:
   a. Headworks to Thompson Br.
   b. Thompson Br. to Community Center Br.
   c. Community Center Br. to mouth

2. 1982 through 1983 - 2 index sections:
   a. Headworks to Shaker Church
   b. Shaker Church to mouth

3. 1983 through 1984 - 4 index sections:
   a. Upper Crossing to Old Bennett Place
   b. Old Bennett Place to Headworks
   c. Headworks to Community Center
   d. Community Center to mouth

Counts have been combined on the main chart to make index areas relatively comparable.

Shitike Creek is surveyed on foot.

FALL CHINOOK REDD COUNTS IN THE DESCHUTES BASIN[a]

SPAWNING YEAR	REDDS	MILES SURVEYED
1963	N.S.	N.S.
1964	N.S.	N.S.
1965	N.S.	N.S.
1966	252	13.0
1967	622	19.5
1968	826	15.5
1969	650	21.5
1970	486	11.0
1971	620	25.5
1972	556	25.5
1973	581	25.5
1974	471	25.5
1975	926	25.5
1976	1139	25.5
1977	642	25.5
1978	376	25.5
1979	650	25.5
1980	867	25.5
1981	538	25.5
1982	N.S.	N.S.
1983	229[b]	25.5
1984	N.S.[c]	N.S.

NOTES

a. Sources: Steve Williams and Jim Newton, Oregon Department of Fish and Wildlife (ODFW), personal communications.

Deschutes River fall chinook spawning ground surveys are conducted by ODFW and Portland General Electric (PGE).

Surveys are two separate counts made on the first week of October and the first week of November.

Twenty five sections of the Deschutes River, from Pelton Dam to the mouth, make up the survey area.

Before 1971, counts were made from boats or fixed wing aircraft. Since 1971, counts have been made from helicopters.

b. Poor visibility below White River probably accounts for the low count in 1983.

c. Poor visibility; no survey.

SUMMER STEELHEAD REDD COUNTS IN THE DESCHUTES BASIN[a]

Index stream mileage is in parentheses

SPAWNING YEAR	SHITIKE CR.[b] (9.95)[c]
1976	35
1977	N.S.
1978	75
1979	90
1980	40
1981	47
1982	64
1983	15
1984	39
1985	53

NOTES

a. Source: Cris Stainbrook and Louie Pitt Jr., Biologists, Confederated Tribes of the Warm Springs Reservation, personal communications.

Surveys are one-time peak counts usually made during the last two weeks of April and the first week of May.

b. Steelhead redd count surveys have been made in other Deschutes River index areas, but only those from Shitike Creek are considered to be accurate. Counting conditions are poor during steelhead spawning season in other index areas.

c. Present index: Upper Crossing to mouth (9.95 mi.).
The index area has remained constant from 1976 through the present.

JOHN DAY RIVER

SPRING CHINOOK REDD COUNTS IN THE JOHN DAY BASIN[a]

Index stream mileages are in parentheses[b]

SPAWNING YEAR	JOHN DAY R.[c] (13.0)	MIDDLE FORK[d] JOHN DAY (10.0)	NORTH FORK DRAINAGE				
			LOWER N. FORK[e] (10.0)	N. FORK (CANYON)[f] (8.0)	GRANITE CR.[g] (5.5)	CLEAR CR.[h] (4.0)	BULL RUN CR.[i] (2.5)
1976	60	66	N.S.[e]	N.S.[f]	111	28	23
1977	63	58	130	131	127	51	29
1978	58	107	68	40	109	25	31
1979	68	118	93	107	86	28	16
1980	16	58	26	52	47	28	3
1981	51	26	67	71	58	45	7
1982	49	62	39	68	66	43	13
1983	133	51	31	45	40	4	2
1984	83	67	23	40	32	8	8

NOTES

a. Sources: Errol Claire and Brad Smith, Oregon Department of Fish and Wildlife (ODFW), personal communication; and Hirose, P. 1979. Northeastern Oregon Spring Chinook and Summer Steelhead Spawning Ground Surveys for 1979, ODFW Information Report No. 80-1.

Counts were made before 1976, but index mileages varied considerably from year to year. Because of this, 1960 through 1975 spring chinook spawning survey information is reported separately as redds/mile. See chart entitled 'Spring Chinook Spawning Densities in the John Day Basin'.

Prior to 1978, surveys were one-time peak index counts. From 1978 through 1983, three separate, total river counts were made. Since 1983, single, peak, total river surveys have been conducted.

b. Index mileages apply to counts made since 1976. See note 'a' above.

c. Present index: Rail Creek to Dad's Creek (13.0 mi.).
Index area has remained constant from 1976 through the present.

d. Present index: Vinegar Creek to Beaver Creek (10.0 mi.).
Index area has remained constant from 1976 through the present.

e. Present index: Big Creek to Nye Creek (10.0 mi.).
Index area has remained constant from 1977 through the present. In 1976, surveys were made but data records are inaccurate.

f. Present index: Granite Creek to Cougar Creek (8.0 mi.).
Index area has remained constant from 1977 through the present. In 1976, surveys were made but data records were inaccurate.

g. Present index: First culvert above the town of Granite to Buck Creek (5.5 mi.).
Index area has remained constant from 1976 through the present.

h. Present index: First log string bridge above Congo Gulch to mouth (4.0 mi.).
Index area has remained constant from 1976 through the present.
Clear Creek is a tributary of Granite Creek.

i. Present index: Boundary Guard Station to mouth (2.5 mi.)
Index area has remained constant from 1976 through the present. Bull Run Creek is a tributary of Granite Creek.

SPRING CHINOOK SPAWNING DENSITIES (REDDS/MILE) IN THE JOHN DAY BASIN[a]

SPAWNING YEAR	JOHN DAY R.	MIDDLE FORK JOHN DAY[c]	N. FORK	GRANITE CR.	CLEAR CR.[d]	BULL RUN CR.[d]	AVERAGE
1960	0.7	3.2	N.S.	10.0	16.3	N.S.	7.5
1961	3.0	1.1	N.S.	5.3	3.3	N.S.	3.2
1962	12.2	2.8	N.S.	44.2	49.7	2.0	22.2
1963	0.8	0.4	N.S.	26.4	29.2	7.0	12.7
1964	1.3	3.6	7.8	34.8	49.7	10.0	17.8
1965	5.8	3.7	8.1	24.4	16.7	7.5	11.0
1966	9.3	6.5	10.3	31.0	43.5	0.3	16.8
1967	7.4	1.7	5.5	19.4	38.5	6.0	13.0
1968	0.7	0.4	8.8	50.2	60.5	6.4	14.4
1969	9.3	4.8	20.5	16.8	13.7	15.6	13.3
1970	8.3	7.6	16.8	33.6	18.7	26.4	14.1
1971	7.0	4.1	11.8	31.2	18.8	11.6	11.5
1972	3.9[b]	5.1	10.5	43.5	39.5	24.4	14.2
1973	8.9	4.3	19.4	36.0	27.0	7.2	15.7
1974	2.5	8.1	7.2	25.5	8.0	7.6	8.2
1975	7.1	8.9	11.7	24.7	11.5	18.8	11.7
1976	4.6	6.6	6.2	20.2	7.0	9.2	7.5
1977	4.9	5.8	16.4	23.1	12.8	11.6	11.1
1978	4.5	10.7	5.9	19.8	6.3	12.4	8.3
1979	5.2	11.8	11.1	15.6	7.0	6.4	9.7
1980	1.2	5.8	4.3	8.5	7.0	1.2	4.3
1981	3.9	2.6	7.7	10.6	11.3	2.8	6.1
1982	3.8	6.2	5.5	12.0	10.8	5.2	6.4
1983	10.2	5.1	4.2	7.3	1.0	0.8	5.8
1984	5.6	6.7	3.5	5.8	2.0	3.2	4.4

NOTES

a. Sources: Annual Reports, John Day District, Oregon Department of Fish and Wildlife (ODFW); Errol Claire,ODFW District Biologist, and Bill Knox, John Day Research Project Director, personal communications.

Redd densities are used here instead of actual redd counts because mileage surveyed varied considerably before 1976. Since 1976, with the consolidation of the Oregon Department of Fish and the Oregon Department of Game, index areas have been standardized.

Redd densities are calculated from index counts (both of standard and varying mileages) and from supplemental surveys of other parts of the John Day Basin.

For actual index redd counts since 1976, see chart entitled "Spring Chinook Redd Counts in the John Day Basin".

Surveys prior to 1978 were one-time peak index counts. From 1978 through 1983, three separate total-river counts were made. Since 1983, one-time peak total-river surveys have been conducted.

b. High flows and limited visibility lowered count.

c. More recent surveys have indicated that historic counts in the Middle Fork of the John Day were probably made too early in the year (September 3-16), missing the peak (approximately September 16) and therefore giving misleading results.

d. Bull Run and Clear Creeks are tributaries of Granite Creek which is a North Fork John Day tributary.

SUMMER STEELHEAD REDD COUNTS IN THE JOHN DAY BASIN[a]

Mainstem John Day

SPAWNING YEAR	BEAR CR. (WHEELER CR.)	MILES SURVEYED	BEECH CR.	MILES SURVEYED	BEECH CR. (E. FORK)	MILES SURVEYED	CANYON CR.	MILES SURVEYED	COTTONWOOD CR.	MILES SURVEYED	FIELDS CR.	MILES SURVEYED	INDIAN CR.	MILES SURVEYED
1960	10	3.0	N.S.		N.S.		10	4.5	12	2.0	7	2.5	N.S.	
1961	9	3.0	N.S.		N.S.		35	5.5	13	2.0	6	2.5	N.S.	
1962	12	3.0	N.S.		5	1.5	22	5.5	8	2.0	5	2.5	N.S.	
1963	7	3.0	N.S.		N.S.		56	5.5	17	2.0	21	2.5	N.S.	
1964	9	3.0	N.S.		N.S.		70	5.5	3	2.0	14	2.5	N.S.	
1965	17	3.5	N.S.		N.S.		29	5.5	17	2.0	6	2.5	7	1.0
1966	53	4.5	134	5.5	109	3.5	75	5.5	15	2.0	71	2.5	15	1.0
1967	72	4.0	45	3.5	48	3.5	207	8.0	28	2.0	30	2.5	12	1.5
1968	58	4.0	13	3.5	18	3.5	83	5.5	0	2.0	0	2.5	N.S.	
1969	31[b]	5.0	29	6.5	69	6.0	68	7.0	5	2.5	6	2.5	17	1.5
1970	72	6.0	N.S.		48	3.5	N.S.		16	2.5	14	2.5	51	2.0
1971	N.S.		N.S.		N.S.		N.S.		N.S.		13	2.5	13	1.5
1972	36	6.0	7	3.5	47	3.5	N.S.		17	2.5	13	2.5	N.S.	
1973	0[d]	2.0	14	3.5	27	3.5	23	5.0	9	2.5	43	2.7	18	2.0
1974	9[c]	6.0	8[c]	3.5	26	3.5	3[c]	2.0	N.S.		N.S.		N.S.	
1975	N.S.		16[c]	3.5	22	3.5	N.S.		14	2.5	21	2.0	N.S.	
1976	38	6.0	9	3.5	15	3.5	50	5.0	8	2.5	14	2.5	14	2.0
1977	N.S.	2.5	32	5.5	37	3.5	116	5.8	0	3.0	0[d]	2.5	0[d]	2.0
1978	41	6.0	N.S.		21	3.5	38	5.0	8	3.0	8	2.5	7	2.0
1979	1	3.0	N.S.		5	3.5	9	5.0	0	2.5	0	2.5	N.S.	
1980	N.S.		16	3.5	20	3.5	18	5.0	2	2.5	6	2.5	5	2.0
1981	31	6.0	16	5.5	17	3.5	25	5.0	5	2.5	7	2.5	9	2.0
1982	26	6.0	13	5.5	18	3.5	N.S.		11	2.5	5	2.5	2	2.0
1983	23	6.0	11	5.5	10	3.5	34	5.5	7	2.5	29	2.5	27	2.0
1984	18	6.0	N.S.		13	3.5	34	5.5	12	2.5	7	2.5	17	2.0

SUMMER STEELHEAD REDD COUNTS IN THE JOHN DAY BASIN[a]

Mainstem John Day

SPAWNING YEAR	KAHLER CR.	MILES SURVEYED	McCLELLAN CR.	MILES SURVEYED	PARISH CR.	MILES SURVEYED	REYNOLDS CR.	MILES SURVEYED	RILEY CR.	MILES SURVEYED	VANCE CR.	MILES SURVEYED
1960	N.S.		N.S.		8	2.0	N.S.		16	1.0	N.S.	
1961	N.S.		N.S.		31	2.0	48	5.0	7	1.0	N.S.	
1962	N.S.		9	1.5	13	2.0	27	4.0	8	1.0	N.S.	
1963	N.S.		N.S.		14	2.0	49	5.0	17	1.0	N.S.	
1964	N.S.		N.S.		15	2.0	50	5.0	15	1.5	N.S.	
1965	21	2.0	N.S.		5	2.0	29	5.0	6	1.5	11	1.0
1966	21	2.0	99	2.5	33	2.0	26	5.0	36	1.5	12	1.0
1967	13	2.5	35	2.5	0	2.0	39	5.0	17	1.5	9	1.0
1968	0	2.5	2	2.5	0	2.0	17	3.5	0	1.5	N.S.	
1969	1	1.0	13	2.5	11	2.0	41	4.0	5	1.5	4	1.0
1970	7	2.0	21	2.5	9	2.5	N.S.		3	1.5	N.S.	
1971	N.S.		N.S.		N.S.		N.S.		0	2.5	N.S.	
1972	5	2.0	10	1.0	0[d]	8.5	N.S.		N.S.		13	1.0
1973	2	3.5	17	1.0	26	4.0	32	3.0	3	3.7	4	1.0
1974	5[c]	1.5	5[c]	1.0	16	3.5	N.S.		N.S.		4[c]	1.0
1975	18[c]	2.0	N.S.		N.S.		N.S.		N.S.		3	1.0
1976	9	2.5	11	1.0	11	3.0	N.S.		5	3.0	4	1.0
1977	0[d]	2.0	10	1.0	0[d]	3.0	37	3.0	N.S.		0[d]	1.0
1978	8	2.0	5	1.0	14	3.0	8	3.0	3	3.5	7	1.0
1979	0	2.0	1	1.0	1	3.0	1	3.0	3	3.0	1	1.0
1980	9	2.0	11	1.0	12	3.0	0	3.0	23	3.0	10	1.0
1981	13	2.0	3	1.0	4	3.0	7	3.0	5	3.0	2	1.0
1982	5	2.0	11	2.0	3	3.0	N.S.		12	3.0	1	1.0
1983	4	2.0	9	2.0	9	3.0	N.S.		10	3.0	6	1.0
1984	2	2.0	5	2.0	18	3.0	N.S.		8	3.0	4	1.0

NOTES

a. Sources: Errol Claire and Brad Smith, Oregon Department of Fish and Wildlife (ODFW), personal communication; ODFW, John Day District Annual Reports; and Hirose, P. 1979. Northeastern Oregon Spring Chinook and Summer Steelhead Spawning Ground Surveys for 1979, ODFW Information Report No. 80-1.

b. In 1969, 31 redds were reported in a 5.0 mile survey area (surveyed on 5/7/69). Twenty eight redds were reported for a 2.5 mile survey area (surveyed on 5/22/69).

c. Low count. High flows occured before spawning ground survey and obscured previously deposited redds.

d. In 1977, low flows and poor fish passage conditions at the mouth of the John Day River occurred.

SUMMER STEELHEAD REDD COUNTS IN THE JOHN DAY BASIN[a]

Middle Fork John Day

SPAWNING YEAR	CAMP CR.	MILES SURVEYED	DEEP CR.	MILES SURVEYED	LICK CR.[b]	MILES SURVEYED
1966	65	3.0	N.S.		N.S.	
1967	34	3.0	20	1.5	N.S.	
1968	12	2.0	2	1.0	9	1.0
1969	16	4.0	N.S.		N.S.	
1970	24	2.0	N.S.		N.S.	
1971	N.S.		N.S.		N.S.	
1972	N.S.		5	1.0	N.S.	
1973	11	2.0	0	1.5	N.S.	
1974	11[c]	2.0	3	1.0	N.S.	
1975	18	2.0	7	1.0	N.S.	
1976	20	2.0	N.S.		N.S.	
1977	114	7.0	0	1.0	N.S.	
1978	78	6.5	5	1.5	N.S.	
1979	10	6.5	N.S.		N.S.	
1980	25	6.5	3	1.5	N.S.	
1981	N.S.[d]		3	1.5	18	2.3
1982	N.S.[d]		4	1.5	14	2.3
1983	27	6.5	4	1.5	5	2.3
1984	15	6.5	4	1.5	9	2.3

NOTES

a. Sources: Errol Claire and Brad Smith, Oregon Department of Fish and Wildlife (ODFW), personal communication, ODFW, John Day District Annual Reports; and Hirose, P. 1979. Northeastern Oregon Spring Chinook and Summer Steelhead Spawning Ground Surveys for 1979, ODFW Information Report No. 80-1.

Surveys are one-time peak index counts.

b. Lick Creek is a tributary of Camp Creek.

c. Low count. High flows occured before spawning ground survey obscuring earlier redds.

d. No survey because of high flows.

SUMMER STEELHEAD REDD COUNTS IN THE JOHN DAY BASIN[a]

North Fork John Day

SPAWNING YEAR	BEAVER CR.	MILES SURVEYED	CABLE CR.[b]	MILES SURVEYED	CAMAS CR.	MILES SURVEYED	OLIVE CR.	MILES SURVEYED	OWING CR.[c]	MILES SURVEYED	RANCHARIA CR.	MILES SURVEYED	WALL CR.	MILES SURVEYED
1964	8	2.0	25	4.0	9	1.5	6	0.5	N.S.		N.S.		N.S.	
1965	N.S.		19	4.0	6[d]	1.5	N.S.		6	2.5	N.S.		N.S.	
1966	37	2.0	46	4.0	18	1.5	N.S.		60	9.0	10	1.0	N.S.	
1967	27	2.0	22	8.0	39	3.5	N.S.		59	2.5	10	1.5	48	5.0
1968	9	2.0	33	5.0	33	7.5	N.S.		2	2.5	N.S.		N.S.	
1969	15	2.0	N.S.		37	4.0	20	2.0	20	3.5	4	1.0	37	3.5
1970	N.S.		61	8.0	8	2.0	N.S.		32	3.0	N.S.		15	3.5
1971	N.S.		N.S.		N.S.		N.S.		31	3.0	N.S.		20	3.5
1972	N.S.		N.S.		N.S.		N.S.		N.S.		N.S.		19	3.5
1973	N.S.		12	5.5	41	4.2	11	2.0	4	3.5	N.S.		5	4.5
1974	N.S.		N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	
1975	N.S.		N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	
1976	N.S.		N.S.		N.S.		N.S.		N.S.		N.S.		15	3.5
1977	7	2.0	N.S.		N.S.		5	2.0	N.S.		N.S.		15	3.5
1978	2	2.0	13	7.0	0	6.0	7	2.0	3	3.0	2	1.0	17	3.7
1979	2	2.0	0	7.0	N.S.		4	2.0	3	3.0	0	1.0	0	3.5
1980	3	2.0	N.S.		N.S.		6	2.0	N.S.		N.S.		19	3.5
1981	4	2.0	N.S.		N.S.		4	2.0	3	3.0	N.S.		5	3.5
1982	N.S.		N.S.		8	2.5	N.S.		9	3.0	2	1.0	6	3.5
1983	6	1.5	11	7.0	N.S.		7	2.0	41	3.5	N.S.		5	3.5
1984	2	1.5	N.S.		2	2.5	1	2.0	16	3.5	5	2.0	N.S.	

NOTES

a. Sources: Errol Claire and Brad Smith, Oregon Department of Fish and Wildlife (ODFW), personal communication, ODFW, John Day District Annual Reports; and Hirose, P. 1979. Northeastern Oregon Spring Chinook and Summer Steelhead Spawning Ground Surveys for 1979, ODFW Information Report No. 80-1.

Surveys are one-time peak index counts.

b. Cable Creek is a tributary of Camas Creek.

c. Owing Creek is a tributary of Camas Creek.

d. Poor counting conditions.

SUMMER STEELHEAD REDD COUNTS IN THE JOHN DAY BASIN[a]

SPAWNING YEAR	South Fork John Day									
	UPPER MURDERER'S CR.	MILES SURVEYED	TEX CR.	MILES SURVEYED	WIND CR.	MILES SURVEYED	BLACK CANYON CR.	MILES SURVEYED	DEER CR.	MILES SURVEYED
1960	58	3.0	54	2.5	N.S.		N.S.		N.S.	
1961	17	3.5	N.S.		N.S.		N.S.		N.S.	
1962	75	3.5	N.S.		N.S.		N.S.		N.S.	
1963	8	3.5	N.S.		N.S.		N.S.		N.S.	
1964	38	3.5	N.S.		N.S.		N.S.		N.S.	
1965	59	3.5	75	2.5	N.S.		N.S.		N.S.	
1966	87	3.5	56	2.5	N.S.		N.S.		N.S.	
1967	39	3.5	25	2.5	N.S.		N.S.		N.S.	
1968	1	3.5	3	2.5	N.S.		N.S.		N.S.	
1969	51	3.5	35	2.5	36	1.0	41	3.5	128	8.0
1970	52	3.5	10	2.5	26	1.0	27	3.5	N.S.	
1971	31	3.5	34	2.5	N.S.		39	3.5	N.S.	
1972	38	3.5	38	2.5	22	1.0	43	3.5	70	8.0
1973	41	2.6	18	2.7	2	1.0	26	3.5	26	6.0
1974	25	3.5	18	2.5	19	1.0	N.S.		32	6.0
1975	56	3.0	32	2.5	N.S.		N.S.		61	6.0
1976	35	2.6	18	2.7	11	1.0	18	3.5	28	6.0
1977	32	2.0	N.S.		0	1.0	25	3.5	N.S.	
1978	23	3.5	27	2.5	5	1.0	12	3.5	23	6.0
1979	8	2.5	11	2.5	6	1.0	0	3.5	3	5.5
1980	16	2.5	10	2.0	14	1.0	6	3.5	17	6.0
1981	N.S.		N.S.		6	1.0	13	3.5	27	6.0
1982	33	2.5	28	2.5	4	1.0	5	3.5	38	5.5
1983	15	2.5	12	2.5	16	1.0	N.S.		N.S.	
1984	27	3.0	30	2.5	6	1.0	N.S.		25	9.0

NOTES

a. Sources: Errol Claire and Brad Smith, Oregon Department of Fish and Wildlife (ODFW), personal communication; ODFW, John Day District Annual Reports; and Hirose, P. 1979. Northeastern Oregon Spring Chinook and Summer Steelhead Spawning Ground Surveys for 1979, ODFW Information Report No. 80-1.

Surveys are one-time peak index counts.

YAKIMA RIVER

SPRING CHINOOK REDD COUNTS IN THE YAKIMA BASIN[a]

Index Stream Mileage is in Parentheses

SPAWNING YEAR	Yakima Mainstem[b]						Cle Elum[c]		Teanaway[d]
	EASTON DAM TO GAME RAMP (7.0)[b1]	GAME RAMP TO FREEWAY BR.[b1] (4.5)	FREEWAY BR. TO S. CLE ELUM BR. (7.9)	S. CLE ELUM BR. TO TEANAWAY R. (7.0)	TEANAWAY R. TO ELLENSBURG DITCH (14.8)	ELLENSBURG DITCH TO BOAT LAUNCH (13.9)	DAM TO BULLFROG ROAD BR. (6.3)	BULLFROG ROAD BR. TO MOUTH (1.9)	MASON CR. TO HIGHWAY BR. (5.1)
1960	-----125------		39	13	N.S.	N.S.	3	N.S	N.S.
1961	-----113------		45	10	N.S.	N.S.	2	N.S.	N.S.
1962	------42------		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1963	-----N.S.-----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1964	------45------		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1965	------50------		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1966	------18------		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1967	------54[b2]----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1968	------34[b2]----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1969	-----190------		40	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1970	------13[b2]----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1971	------54[b2]----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1972	------56[b2]----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1973	------23[b2]----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1974	------22[b2]----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1975	------58[b2]----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1976	------60------		26	N.S.	N.S.	N.S.	7	N.S.	11[d1]
1977	------43------		24	N.S.	N.S.	N.S.	10	N.S.	N.S.
1978	-----171------		55	N.S.	N.S.	N.S.	9	N.S.	0[d1]
1979	------48[b3]----		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1980	-----204------		43	60	N.S.	N.S.	5	N.S.	N.S.
1981	126	35	30	39	2	5	------57[c1]----		0
1982	196	92	159	80	8[b4]	N.S.	------30[c1]----		N.S.
1983	104	32	87	77	20	25	------15[c1]----		0
1984	302	66	145	67	9	11	------31[c1]----		0

SPRING CHINOOK REDD COUNTS IN THE YAKIMA BASIN[a]

Index Stream Mileage is in Parentheses

SPAWNING YEAR	Naches R.[e]				Rattlesnake Cr.[f]	Little Naches R.[g]	
	INDIAN FLAT C.G. TO BUMPING/LITTLE NACHES CONF.[e1] (2.5)	BUMPING/LITTLE NACHES CONF. TO CLIFFDELL [e1] (3.5)[e1]	CLIFFDELL TO UPPER NILE BR. (9.9)	UPPER NILE BR. TO HORSESHOE BEND (10.0)	NORTH FORKS BR. TO MOUTH (7.7)	LITTLE NACHES FALLS TO KANER FLAT C.G. (1.5)	KANER FLAT C.G. TO MOUTH (2.9)
1960	3	21	N.S.	N.S.	8	------2[g1]---	
1961	-----17-----		N.S.	N.S.	8	N.S.	3
1962	15	16	N.S.	N.S.	2	------3[g1]---	
1963	-----11-----		N.S.	N.S.	7	Ø	3
1964	7	13	N.S.	N.S.	N.S.	------Ø-----	
1965	4	9	N.S.	N.S.	N.S.	------3[g1]---	
1966	5	4	N.S.	N.S.	N.S.	------6[g1]---	
1967	------4-----		N.S.	N.S.	N.S.	N.S.	N.S.
1968	------6-----		N.S.	N.S.	N.S.	N.S.	N.S.
1969	-----1Ø-----		N.S.	N.S.	N.S.	N.S.	N.S.
1970	-----14-----		N.S.	N.S.	N.S.	N.S.	N.S.
1971	----N.S.----		N.S.	N.S.	N.S.	N.S.	N.S.
1972	N.S.	13	N.S.	N.S.	N.S.	N.S.	N.S.
1973	-----11-----		N.S.	N.S.	N.S.	N.S.	Ø
1974	-----1Ø-----		N.S.	N.S.	N.S.	N.S.	2
1975	-----21-----		N.S.	N.S.[e4]	N.S.	N.S.	N.S.
1976	7	13	-----56-----		8	------1[g1]---	
1977	Ø	4	N.S.	N.S.	N.S.	------Ø[g1]---	
1978	5[e2]	29	11[e5]	14[e6]	1	N.S.	4
1979	6[e2]	35	4[e7]	N.S.	N.S.	1[g2]	6
1980	11[e2]	14	16	N.S.	N.S.	N.S.	N.S.
1981	5[e3]	35	21	8	Ø[f1]	-----16[g3]---	
1982	------5[e3]---		17	3	2[f1]	-----12[g4]---	
1983	4[e3]	13	7	3	4[f1]	7[g5]	2[g5]
1984	6[e3]	17	22	18	24	20	21

SPRING CHINOOK REDD COUNTS IN THE YAKIMA BASIN[a]

Index Stream Mileage is in Parentheses

SPAWNING YEAR	Bumping River[h]					American River[i]					
	DAM TO GOOSE PRAIRIE (2.7)	GOOSE PRAIRIE TO COUGAR FLAT (3.4)	COUGER FLAT TO SODA SPRINGS (1.8)	SODA SPRINGS TO EDGEWATER SUMMER HOMES (3.1)	EDGEWATER SUMMER HOMES TO AMERICAN R. CONF. (2.5)	MORSE CR. TO LODGEPOLE C.G. (2.6)	LODGEPOLE C.G. TO UNION CR. (1.5)	UNION CR. TO PLEASANT VALLEY C.G. (1.8)	PLEASANT VALLEY C.G. TO SUMMER HOMES (1.7)	SUMMER HOMES TO HELL'S CROSSING (2.1)	HELL'S CROSSING TO BUMPING CONF. (5.9)
1960	----------18[h1]----------					N.S	N.S.	N.S.	27	N.S.	N.S.
1961	----------18[h1]----------					1	Ø	1	37	N.S.	N.S.
1962	----------1[h1]----------					Ø	11	22	37	11	2
1963	----------1Ø[h1]----------					N.S.	N.S.	N.S.	63	N.S.	N.S.
1964	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	6	N.S.	N.S.
1965	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	8	N.S.	N.S.
1966	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	29	N.S.	N.S.
1967	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	19	N.S.	N.S.
1968	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	4	N.S.	N.S.
1969	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	1Ø	N.S.	N.S.
1970	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	5	N.S.	N.S.
1971	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1972	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	9	N.S.	N.S.
1973	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	Ø	N.S.	N.S.
1974	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	2	N.S.	N.S.
1975	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
1976	----------34[h1]----------					N.S.	N.S.	N.S.	1	N.S.	N.S.
1977	N.S.	N.S.	N.S.	2	N.S.	N.S.	N.S.	N.S.	Ø	N.S.	N.S.
1978	N.S.	N.S.	N.S.	17	13[h2]	N.S.	N.S.	19[i1]	4	14	9[i2]
1979	N.S.	N.S.	N.S.	13	24[h2]	N.S.	N.S.	3	2Ø	12	N.S.
1980	N.S.	N.S.	N.S.	8	3[h2]	N.S.	N.S.	9	18	11	N.S.
1981	----------7----------			-----8-----		Ø	1	16	32	21	2
1982	-----1------		Ø	-----2-----		Ø	Ø	2	4	5	Ø
1983	Ø	3	3	-----1-----		Ø	Ø	13	12	1Ø	1
1984	6	------4-------		----1Ø-----		Ø	2	7	28	28	7

NOTES

a. Overview

a1. Sources

Hollowed, J. 1984. Yakima River Basin Spring Chinook Spawning Ground Surveys 1981-1983, Information Report No. 83-8, Yakima Indian Nation; Spawning Ground Survey Summaries, Stream Survey Files, Natural Production Division, Major Projects Section, Washington Department of Fisheries, Olympia, WA.; Field notes from Washington Department of Fisheries annual spawning ground survey reports, Yakima Field Office.

Personal communication with: John Easterbrooks, Yakima Field Office, Washington Department of Fisheries; Doug Dompier, Columbia River Inter-Tribal Fish Commission (formerly with National Marine Fisheries Service; Mike Kohn, Fisheries Assistance Office, Yakima Region, U.S. Fish and Wildlife Service; Bob Tuck, Confederated Tribes and Bands of the Yakima Indian Nation.

a2. Survey History and Methods

Prior to 1976, a single peak count survey was made yearly at each historic index area in the Yakima Basin. Surveys were conducted by the Washington Department of Fisheries (WDF), National Marine Fisheries Service (NMFS), and U.S. Fish and Wildlife Service (USFWS).

From 1976 through 1980, a larger section of the Yakima River basin was studied by these agencies along with the Confederated Tribes and Bands of the Yakima Indian Nation (YIN). Some new 'optional' index areas were added, some historic index areas were expanded, and a more detailed reporting method was used during this period. The one time peak count was the method of survey.

From 1981 through the present, the USFWS, WDF and YIN have cooperatively carried out a more complete and accurate 'total' spawning ground survey program. New index areas have been added and, in some cases, old ones changed. In addition to an increase in the geographical area studied, multiple surveys are now conducted each year, numbering as many as seven on some streams in certain years.

b. Yakima Mainstem

b1. Present index: Since 1980, two separate index areas are counted: Easton Dam to Game Ramp (7.0 mi.) and Game Ramp to Freeway Bridge (also called Twin Bridges) 4.5 mi.

From 1960 through 1980, the two index areas were combined and counted as one (Easton Dam to Freeway Bridge [11.5 mi.]). Although no breakdown of counts is available during these years, the earlier index is equivalent to a combination of the two areas presently surveyed. See also note b2 below.

b2. In 1967, 1968, and 1970 through 1975, the index area was Easton Dam to Elk Meadows (8.2 mi.). Elk Meadows lies 3.3 mi. upstream of the lower boundary of the standand index (Freeway Bridge).

b3. In 1979, bad weather at the usual peak counting time caused the survey to be made 15 days later than usual.

b4. In 1982, survey area was the Teanaway River to Thorp (10.7 mi.). Thorp lies 4.1 mi. upstream of the lower standard index area boundary (Ellensburg Ditch).

c. Cle Elum River

Present index: Dam to mouth (8.2 mi.)

In 1960, 1961, 1976 through 1978, and 1980, surveys were only made from the Dam to Bullfrog Road Bridge (6.3 mi.). Although this index is not geographically comparable to the area counted since 1980, some comparisons in survey results may be made because very little, if any, spawning presently occurs in the additional 1.9 mile stretch between Bullfrog Road Bridge and the mouth. (Tuck, personal communication).

c1. Since 1980, there was a sharp increase in spawning ground counts because of a decrease in late summer streamflows as a result of regulations controlling releases from Cle Elum Dam ('Flip-Flop Operation' decision).

In 1981, the Cle Elum flows were actually four times higher than those in the Yakima mainstem (650 cfs/150 cfs). Mainstem bound fish were probably drawn into the Cle Elum to spawn. Flows have been managed at an approximate equal split (250-300 cfs) since 1981. (Easterbrooks, personal communication.)

d. Teanaway River

Present index: Mason Creek to Highway Bridge (5.1 mi.).

Index area has remained constant from 1960 through the present.

There is very little spawning in the Teanaway River at present because of severe channelization and irrigation diversions.

d1. In 1976 an optional survey from river mile 6.Ø to the mouth (Ø.9 additional miles) yielded two redds.

e. Naches River

e1. Present index: In 196Ø, 1962, 1964 through 1966, 1972, and 1976 through the present, two separate survey areas have been counted. These are Indian Flat Campground to the Bumping River/Little Natches River confluence (2.5 mi.), and the Bumping River/Little Naches River confluence to Cliffdell (3.5 mi.).

In years not mentioned above, the two index areas were counted as one (Indian Flat to Cliffdell [6.Ø mi.]). Although no breakdown of counts is available for these years, the present index is equivalent to a combination of the two areas presently surveyed. See also note e2 below.

e2. The Indian Flat Campground to the Bumping River/Little Naches confluence index was, from 1978 through 198Ø, counted as part of the Bumping River survey. Those counts are also included here for comparative purposes. See note h2.

e3. From 1981 through 1984, surveys included the additional area between the Bumping River/American River confluence and Indian Flat Campground (1.Ø mi.). This area lies upstream of the upper boundary of earlier years' surveys (Indian Flat Campground).

e4. In 1976, the two index areas were counted as one (Cliffdell to Horseshoe Bend (19.9 mi.). Although no breakdown of counts is available in 1976, the index is geographically equivalent to a combination of the two standard index areas surveyed from 1981 through 1984 (Cliffdell to Upper Nile Bridge [9.9 mi.] and Upper Nile Bridge to Horseshoe Bend [1Ø.Ø mi.]).

e5. In 1978, survey was 1.Ø mi. short of the standard lower index boundary (Upper Nile Bridge). Total mileage was 8.9.

e6. In 1978, survey included 1.Ø mi. above the standard upper index boundary (Upper Nile Bridge). Total mileage was 11.Ø.

e7. In 1979, index area was Cliffdell to Cottonwood Campground (4.3 mi.). This survey excluded 5.6 mi. of the standard index below the lower boundary (Upper Nile Bridge).

f. Rattlesnake Creek

Present index: North Forks Bridge to mouth (7.7 mi.).

Index area has remained constant from 1960 through the present.

f1. From 1981 through 1983, surveys only included 2.0 mi. of the standard 7.7 mi. index.

g. Little Naches River

Present index: Little Naches Falls (also called Salmon Falls) to Kaner Flat Campground (1.5 mi.) and Kaner Flat Campground to mouth (2.9 mi.). See also notes g2 through g5 below.

g1. In 1960, 1962, 1964 through 1966, 1976, 1977, 1981, and 1982, the two survey areas of the present index were combined and counted as a single index (Little Naches Falls to mouth [4.4 mi.]). Although no breakdown of counts is available for these years, the index is geographically equivalent to a combination of the two standard index areas presently counted. See also notes g2 through g5 below.

g2. In 1979, the survey area was Quartz Creek to Kaner Flat Campground (0.5 mi.). The 1.0 mi. of standard index between Little Naches Falls and Quartz Creek were not counted.

g3. In 1981, the survey area was Pileup Creek to mouth. Of a total of 16 redds reported, all were counted between Little Naches Falls and the Little Naches mouth.

g4. In 1982, the survey area was Pileup Creek to mouth. Of a total of 12 redds reported, all were counted between Little Naches Falls and the Little Naches mouth.

g5. In 1983, the survey area was Bridge Crossing to mouth. Of a total of nine redds reported, seven were counted in an area that would constitute the Little Naches to Kaner Flat Campground index.

h. Bumping River

Present index: In 1984, the index areas were: Dam to Goose Prairie (2.7 mi.), Goose Prairie to Soda Springs (5.2 mi.), and Soda Springs to American River Confluence (5.6 mi.). Refer to Redd Count Chart for the many index area changes.

h1. From 1960 through 1963, and in 1976, the index area was Dam to the mouth of the Bumping River (17.0 mi.). This area includes and additional 2.5 mi below the lower boundary of the index surveyed from 1978 through 1980 (Indian Flat

Campground). It includes an additional 3.5 mi. below the lower boundary of the index surveyed from 1981 through 1984 (American River confluence).

h2. In 1978, 1979, and 1980, this survey area included an additional 1.0 mi. between the American River confluence and Indian Flat Campground. See note e2 above.

i. American River

i1. Different stream survey personnel (from the 2 other index areas counted in 1978) may have made the Union Cr. to Pleasant Valley Campground count of 19 redds inaccurate.

i2. In 1978, index area was Hell's Crossing downstream 1.5 mi. The lower boundary of this area was 4.4 mi. upstream of the lower standard index boundary (Bumping River confluence).

SUMMER CHINOOK REDD COUNTS IN THE YAKIMA BASIN[a]

Index stream mileage surveyed is in parentheses

SPAWNING YEAR	YAKIMA[b] MAINSTEM (24.0)
1962	16
1963	1
1964	10
1965	1
1966	0
1967	67
1968	5
1969	4
1970[c]	3[c]

NOTES

a. Source: John Easterbrooks, Washington Department of Fisheries (WDF), personal communication.

Surveys are one-time peak counts.

Summer chinook spawning ground surveys in the Yakima basin were made from fixed wing aircraft.

b. Index area: Union Gap to Granger (24.0 mi.)
Index area remained constant from 1962 through 1970.

c. Surveys were discontinued after 1970.

FALL CHINOOK REDD COUNTS IN THE YAKIMA BASIN[a]

Index stream mileage is in parentheses

SPAWNING YEAR	RIVER MILE 32.0 TO MOUTH[b] (32.0)	MARION DRAIN[c] (17.0)
1963	108	N.S.
1964	40	N.S.
1965	66	N.S.
1966	135	N.S.
1967	177	N.S.
1968	62	N.S.
1969	829	N.S.
1970	634	N.S.
1971	88	N.S.
1972	136	N.S.
1973	174	N.S.
1974	131	N.S.
1975	339	N.S.
1976	247	N.S.
1977	82	N.S.
1978	32	N.S.
1979	N.S.	N.S.
1980	11	N.S.
1981	12	74
1982	33	N.S.
1983	50	101
1984	118	81[d]

NOTES

a. Source: Eric Barth, Biologist, Confederated Tribes and Bands of the Yakima Indian Nation (YIN), personal communication; John Easterbrooks, Washington Department of Fisheries (WDF), personal communication; Watson, D.G. 1985. Summary of Lower Yakima River Fall Chinook Spawning Ground Surveys. Unpublished memo to John Easterbrooks; field notes from WDF annual surveys, Yakima Field Office.

b. Present index: 2.Ø miles upstream from the Benton City-Kiona Bridge to the mouth (32.Ø mi.).

These surveys are conducted by Batell Inc. (Don G. Watson, Biologist). They were made with fixed wing aircraft and, because poor counting conditions are typical during the Yakima River fall chinook spawning period, the accuracy of these surveys is considered questionable.

c. The Marion Drain surveys were begun in 1981 and are conducted by the YIN.

Counts are made using both boat and foot surveys. Areal checks are also made for calibration of counts.

d. A supplemental survey counted five redds in an additional 17 mi. section from Horn Rapids Dam to the mouth.

WENATCHEE RIVER

SPRING CHINOOK REDD COUNTS IN THE WENATCHEE BASIN[a]

Index stream mileage surveyed is in parentheses[b]

SPAWNING YEAR	WENATCHEE R.[c,e,f] (7.4)	ICICLE R.[h] (2.8)	CHIWAWA R.[i] (8.0)[i,j]	WHITE R.[k] (3.0)	LITTLE WENATCHEE[m] (2.5)[m,n]	NASON CR.[o] (7.2)
1961	9[d]	19	64	5	13	57
1962	21	14	154	10	38	233
1963	30	21	148	13	30	77
1964	32	62	116	20	19	214
1965	27	20	198	31	75	250
1966	32	26	561	34	138	315
1967	13	28	254	54	93	163
1968	N.S.	45	282	22	52	347
1969	N.S.	9	278	24	20	158
1970	N.S.	11	276	6	11	113
1971	N.S.	20	114	48	20	37
1972	61[e]	21	215	40[l]	32	92
1973	43[f]	11	427	51	78	368
1974	1	120	87[j]	37	20	183
1975	N.S.	178	229	22	14	254
1976	18[g]	138	220	36[l]	19[n]	103
1977	46[g]	15	293	39	0	94
1978	39[g]	55	279	44	27	233
1979	27[g]	89	59	N.S.	0	70
1980	11[g]	91	119	N.S.	22	66
1981	26	18	84	18	36	69
1982	1	21	97	19	40	93
1983	N.S.	15	165	69[l]	51	139
1984	13	43	181	49	64	71

NOTES

a. Sources: John Easterbrooks, Washington Department of Fisheries (WDF), personal communication; field notes from WDF annual surveys, Yakima Field Office.

Surveys are one-time peak index counts.

Spawning ground surveys are either float or foot counts (depending on water conditions).

b. Unless otherwise indicated. See footnotes below.

c. Present index: Plain Bridge to Lake Wenatchee (7.4 mi.).
Index area has remained constant from 1961 through the present.

d. An additional three redds were counted from Plain Bridge to Tumwater Bridge (10.6 mi.).

e. Incomplete survey in 1972 (Lake Wenatchee downstream 3.0 mi.).

f. Incomplete survey in 1973 (Lake Wenatchee downstream 2.0 mi.)

g. From 1976 through 1980, surveys were conducted by Chelan County PUD.

h. Present index: Leavenworth Hatchery to mouth (2.8 mi.)
Index area has remained constant from 1961 through the present.

i. Present index: Maple Creek Campground to Rock Creek Guard Station (8.0 mi.).
Index area has remained constant from 1961 through the present.

j. The 1974 index area was Phelps Creek to 0.5 mi. above Schafer Campground (7.4 mi.). This area begins 2.8 mi. upstream of the standard index boundary (Maple Creek Campground) and ends 3.8 mi. upstream of the standard index boundary (Rock Creek Guard Station).

k. Present index: Grasshopper Meadows Campground to Napequa Creek (3.0 mi.).
Index area has remained constant from 1961 through the present.

l. Supplemental surveys were made on the White River in 1972, 1976, and 1983 and counted from the mouth of Napequa Creek to Sears Bridge (4.6 mi.).

In 1972, 19 redds were counted.
In 1976, 8 redds were counted.
In 1983, 2 redds were counted.

m. Present index: From 1980 through the present, Big Bend Falls to the mouth of Lost Creek (2.5 mi.).
From 1961 through 1979, index was 'Big Bend Falls to U.S. Fish and Wildlife Service Weir' (5.0 mi.).
Index area was shortened because few spring chinook were found to spawn below Lost Creek.

n. The index area in 1976 was Hidden Creek to Lost Creek (1.5 mi.). This survey begins 1.0 mi. downstream of the present standard index area's upstream boundary (Big Bend Falls).

o. Present index: White Pine Creek to U.S. Rt. 2 Highway Bridge (7.2 mi.). Index area has remained constant from 1961 through the present.

SUMMER CHINOOK REDD COUNTS IN THE WENATCHEE BASIN[a]

Index stream mileage surveyed is in parentheses[b]

SPAWNING YEAR	WENATCHEE R. (52.6)[c]
1960	502
1961	872
1962	1018
1963	1223
1964	1113
1965	704
1966	1260
1967	1219
1968	1542
1969	1154
1970	1333
1971	1419
1972	1364
1973	1144
1974	1155
1975	925
1976	793
1977	997
1978	1184
1979	571[d]
1980	1127
1981	883
1982	800[e]
1983	552
1984	942

NOTES

a. Source: John Easterbrooks, Washington Department of Fisheries (WDF), personal communication; field notes from WDF annual surveys, Yakima Field Office.

Surveys are one-time peak counts.

Spawning ground surveys for summer chinook in the Wenatchee River are made from fixed wing aircraft.

b. Unless otherwise noted. See footnote 'd' below.

c. Present index: Lake Wenatchee to head of Rock Island Pool 1.Ø mi. above Wenatchee River mouth (52.6 mi.).
Index area has remained constant from 196Ø through the present except in 1979 (see footnote 'd' below).

d. In 1979, the index was Tumwater Canyon to Rock Island Pool (26.4 mi.). Survey was shortened because of bad weather.

e. In 1982, WDF counted 553 redds in the Tumwater Canyon to Rock Island Pool section of the standard index. In a survey conducted one week earlier by Chelan County PUD, 247 redds were counted in the upper section of the standard index (Lake Wenatchee to Tumwater Canyon).

ENTIAT RIVER

SPRING CHINOOK REDD COUNTS IN THE ENTIAT RIVER[a]

Index stream mileage surveyed is in parentheses

SPAWNING YEAR	ENTIAT R.[b] (6.8)
1960	117
1961	44
1962	115
1963	145
1964	384
1965	104
1966	307
1967	252
1968	252
1969	133
1970	70[c]
1971	136
1972	61[d]
1973	229
1974	88
1975	156
1976	47
1977	171
1978	326
1979	N.S.
1980	107
1981	95
1982	107
1983	107
1984	85

NOTES

a. Source: John Easterbrooks, Washington Department of Fisheries (WDF), personal communication; field notes from WDF annual surveys, Yakima Field Office.

Surveys are one-time peak index counts.

Spawning ground surveys for spring chinook in the Entiat River are made on foot.

b. Present index: Fox Creek Campground to Ski Hill (6.8 mi.). Index area has remained constant from 1960 through the present.

c. A fire occurred in August, 1970 in this section of the Entiat basin.

d. Springtime flooding occurred in the Entiat in 1972.

SUMMER CHINOOK REDD COUNTS IN THE ENTIAT BASIN[a]

Index stream mileage surveyed is in parentheses

SPAWNING YEAR	ENTIAT R.[b] (10.0)
1960	6
1961	8
1962	7
1963	3
1964	24
1965	16
1966	23
1967	54
1968	54
1969	41[c]
1970	26
1971	18
1972	6
1973	24
1974	0
1975	0
1976	6
1977	4
1978	13
1979	6
1980	8
1981	7
1982	8
1983	1
1984	N.S.[d]

NOTES

a. Source: John Easterbrooks, Washington Department of Fisheries (WDF), personal communication; field notes from WDF annual surveys, Yakima Field Office.

Surveys are one-time peak index counts.

Spawning ground surveys for summer chinook in the Entiat River are made from fixed wing aircraft.

Natural production of summer chinook in the Entiat River is largely made up of Entiat and Wells Hatchery strays. The Entiat Hatchery summer chinook program ended with releases made in 1964. Summer chinook from Wells Hatchery were released in the Entiat River in 1976.

b. Present index: Ardenvoir to mouth (10.0 mi.).
Index area has remained constant from 1960 through the present.

c. An additional nine redds were counted in the larger index area of 'Brief to the mouth'.

d. Summer chinook spawning ground surveys were discontinued on the Entiat River in 1984 because the spawning population had nearly disappeared.

METHOW RIVER

SPRING CHINOOK REDD COUNTS IN THE METHOW BASIN[a]

Index stream mileage surveyed is in parentheses[b]

SPAWNING YEAR	Lost River		Chewack River				
	EUREKA CR. TO LOST R. BR.[c] (3.5)	LOST R. BR. TO MOUTH[d] (0.4)	CAMP 4 TO CHEWACK C.G.[f] (3.2)	CHEWACK C.G. TO FALLS CR. C.G.[g] (3.5)	TWISP R.[l] (7.7)	METHOW R.[m] (5.7)	EARLY WINTERS CR.[n] (1.0)[n]
1960	20	N.S.	-----155[h]-----		199	97	2
1961	6	N.S.	------56[h]-----		45	23	6
1962	104	N.S.	9	49[i]	203	187	N.S.
1963	35	N.S.	N.S.	78	132	110	N.S.
1964	98	N.S.	N.S.	176	311	127	N.S.
1965	-----86[e]----		N.S.	34	138	111	N.S.
1966	----271[e]----		N.S.	91	257	233	N.S.
1967	80	22	N.S.[j]	N.S.	135	140	N.S.
1968	35	2	30[k]	N.S.	190	92	1
1969	49	11	17	32	123	57	3
1970	101	N.S.	14	32	75	150	1
1971	61	9	10	23	97	113	6
1972	58	11	------97[h]-----		97	65	N.S.
1973	65	5	47	42	247	95	1
1974	11	N.S.	22	30	129	49	3
1975	59	N.S.	N.S.	98	177	39	2
1976	12	N.S.	N.S.	22	53	34	N.S.
1977	-----14[e]----		N.S.	107	174	65	0
1978	50	N.S.	87	59	265	67	4
1979	23	3	18	13	40	12	0
1980	13	4	8	14	27	25	0
1981	20	5	1	6	24	39	2
1982	29	4	2	8	17	56	0
1983	18	4	6	29	58	63	1
1984	54	6	24	15	48	43	3[o]

NOTES

a. Source: John Easterbrooks, Washington Department of Fisheries (WDF), personal communication; field notes from WDF annual surveys, Yakima Field Office.

Surveys are one-time peak index counts.
Spawning ground surveys for spring chinook in the Methow Basin are made on foot.

b. Except where otherwise indicated, see footnotes below.

c. Present index: Eureka Creek to Lost River Bridge (3.5 mi.). Index area has remained constant from 1960 through the present.

d. Present index: Lost River Bridge to mouth (0.4 mi.). Index area was counted as an optional survey in 1967, 1968, 1969, 1971, 1972, and 1973. It has been regularly counted as one of the standard index streams from 1979 through the present.

e. In 1965, 1966, and 1977, no breakdown for the two index areas is available. The only counts recorded are for the entire area from Eureka Creek to the mouth (3.9 mi.).

f. Present index: Camp 4 to Chewack Campground (3.2 mi.).

g. Present index: Chewack Campground to Falls Creek Campground (3.5 mi.).
Index area has remained constant from 1960 through the present except for 1960, 1961, and 1972 (See note "h" below).

h. In 1960, 1961, and 1972, no breakdown for the two index areas is available. The only counts recorded are for the entire area from Camp 4 to Falls Creek Campground (6.7 mi.).

i. In 1967, ten redds were counted from Falls Creek Campground to Memorial Campground (4.8 mi.). This area lies downstream of the lower boundary of the standard index area.

j. In 1967, 15 redds were counted from Lake Creek Campground to Chewack Campground (6.2 mi.). This area begins 3.0 mi. upstream of the upper standard index boundary (Camp 4).

k. In 1968, 33 redds were counted from Lake Creek Campground to Camp 4 (3.0 mi.). This area lies upstream of the upper boundary of the standard index area.

l. Present index: Mystery Bridge to Buttermilk Creek Bridge (7.7 mi.).
Index area has remained constant from 1960 through the present.

m. Present index: Mazama Bridge to Weeman Bridge (5.7 mi.).
Index area has remained constant from 1960 through the present.

n. Present index: Early Winters Diversion Dam intake to mouth (1.0 mi.).
Index area has remained constant from 1960 through the present.

o. In 1984, three additional redds were counted in the 0.5 miles above the 'Early Winters Diversion Dam intake to mouth' index. Boundaries for this new index area are Willis Ditch intake to Early Winters Diversion Dam intake.

SUMMER CHINOOK REDD COUNTS IN THE METHOW BASIN[a]

Index stream mileage surveyed is in parentheses

SPAWNING YEAR	METHOW R.[b] (49.5)
1961	120
1962	678
1963	304
1964	795
1965	562
1966	1275
1967	733
1968	659
1969	329
1970	705
1971	562
1972	325
1973	366
1974	223
1975	432
1976	191
1977	365
1978	518
1979	622
1980	345
1981	195
1982	142
1983	65
1984	162

NOTES

a. John Easterbrooks, Wahington Department of Fisheries (WDF), personal communication; field notes from WDF annual surveys, Yakima Field Office.

Surveys are one-time peak index counts.

Spawning ground surveys for summer chinook in the Methow River are made from fixed wing aircraft.

b. Present index: Winthrop National Fish Hatchery Diversion Dam to the head of Wells Pool (49.5 mi.).
Index area has remained constant from 1961 through the present.

OKANOGAN RIVER

SUMMER CHINOOK REDD COUNTS IN THE OKANOGAN BASIN[a]

Index stream mileage surveyed is in parentheses[b]

SPAWNING YEAR	OKANOGAN R.[c] (60.4)[e]	SIMILKAMEEN R.[d] (8.8)[d]
1960	29[c]	N.S.
1961	N.S.	N.S.
1962	N.S.	N.S.
1963	9	17
1964	112[c]	51
1965	109[c]	67
1966	389[c]	154
1967	149	77
1968	232	107
1969	103	83
1970	656	357
1971	310	210
1972	182	55
1973	138	64
1974	113	130
1975	273	201
1976	107	184
1977	276	139
1978	195	268
1979	173	138
1980	118	172
1981	55	121
1982	23	59
1983	36	57
1984	235	301

NOTES

a. Source: John Easterbrooks, Washington Department of Fisheries (WDF), personal communication; field notes from WDF annual surveys, Yakima Field Office.

Surveys are one-time peak index counts.

Spawning ground surveys for summer chinook in the Okanogan and Similkameen Rivers are made from fixed wing aircraft.

b. Unless otherwise noted. See footnote 'c' below.

c. Present index: Zosel Dam to Malott (60.4 mi.).
From 1960 through 1966, index area was 'Zosel Dam to the mouth' (77.4 mi.). Index area was decreased when construction of Wells Dam created Wells Pool which flooded the lower 17 miles of the Okanogan River.

d. Present index: Enloe Dam to mouth (8.8 mi.).
Index area has remained constant from 1960 to the present.

TUCANNON RIVER

SPRING CHINOOK REDD COUNTS IN THE TUCANNON BASIN[a]

Index stream mileage surveyed is in parentheses

SPAWNING YEAR	PANJAB CR. BR. TO COW CAMP BR. (1.5)	COW CAMP BR. TO CAMP WOOTON BR. (2.4)
1960	N.S.	42
1961	N.S.	102
1962	N.S.	52
1963	N.S.	21
1964	N.S.	61
1965	N.S.	24
1966	N.S.	65
1967	N.S.	40
1968	N.S.	18
1969	27	61
1970	N.S.	62
1971	N.S.	6
1972	N.S.	23
1973	N.S.	24
1974	N.S.	18
1975	N.S.	37
1976	N.S.	13
1977	N.S.	19
1978	N.S.	N.S.
1979	N.S.	N.S.
1980	8	38
1981	8	67
1982	19	27
1983	12	40
1984	21	31

NOTES

a. Source: John Easterbrooks, Washington Department of Fisheries (WDF), personal communication; field notes from WDF annual surveys, Yakima Field Office.

From 1960 through 1983, surveys were one-time peak index counts.
In 1984 and 1985, a one-time peak count was made in all spawning habitat of the Tucannon River. The counts reported in the attached chart are for index areas only.

Spring chinook spawning ground surveys in the Tucannon basin are made on foot.

GRANDE RONDE RIVER

SPRING CHINOOK SALMON REDD COUNTS IN THE GRAND RONDE BASIN[a]

Index stream mileage surveyed is in parentheses[b]

SPAWNING YEAR	LOSTINE R.[c] (3.0)	MINAM RIVER			LOOKINGGLASS CR.[g] (7.5)	CATHERINE CR.							
		UPPER MINAM R.[d] (6.0)	LOWER MINAM R.[e] (6.0)	LITTLE MINAM R.[f] (1.5)		SOUTH FORK[i] (2.0)	NORTH FORK[j] (3.0)	LOWER CATHERINE CREEK[k] (7.5)	UPPER GRANDE RONDE R.[l] (8.5)	WALLOWA R.[m] (4.0)	HURRICANE CR.[n] (5.0)	WENAHA R.[o] (6.0)	BEAR CR.[p] (7.0)
1960	95[c]	N.S.	52	20	75	N.S.	N.S.	182	73[1]	N.S.	N.S.	N.S.	N.S.
1961	44[c]	N.S.	19	18	82	N.S.	N.S.	20	122[1]	N.S.	N.S.	N.S.	N.S.
1962	53[c]	N.S	86	32	83	N.S.	N.S.	66	179[1]	N.S.	N.S.	N.S.	N.S.
1963	97[c]	N.S.	43	20	55	N.S.	N.S.	18	20[1]	41	33	186	N.S.
1964	186[c]	68[d]	83	25	141	N.S.	N.S.	3	172[1]	35	28	167	24
1965	92[c]	78[d]	48	27	101	N.S.	N.S.	47	128[1]	32	17	79	15
1966	182[c]	77[d]	44	25	210	N.S.	N.S.	15	143[1]	14	1	278	12
1967	151[c]	32[d]	18	7	92	17	31	27	216[1]	15	3	185	11
1968	124[c]	30	77	10	92	7	15	51	304[1]	11	20	128	40
1969	105[c]	106	75	7	165	43	19	85	194	17	9	254	23
1970	80[c]	82	93	8	188	3	19	51	51	14	17	379	25
1971	82[c]	49	60	11	149	86	28	121	129	12	23	164	30
1972	127[c]	66	72	19	63	21	38	85	110	5	18	71	55
1973	167[c]	48	70	9	101	33	73	116	52	11	10	205	16
1974	117[c]	36	15	22	27	19	17	70	61	7	11	49	21
1975	33[c]	25	25	13	28	12	9	21	42	1	2	30	33
1976	75[c]	24	28	N.S	40	21	13	78	75	15	0	20	17
1977[b]	25	N.S.	14	N.S.	32	N.S.	4	6	92	2	0	60	12
1978	120	72	72	N.S.	25	26	7	47	42	18	11	77	25
1979	21	6	3	N.S.	13	5	0	36	7	0	0	5	4
1980	18	7	3	N.S.	29	0	0	66	32	1	0	24	8
1981	8	12	2	N.S	7[h]	3	3	16	38	0	1	20	4
1982	58	13	9	N.S.	26[h]	7	14	42	29	1	9	27	12
1983	39	13	8	N.S.	7[h]	4	11	43	49	5	7	23	6
1984	57	17	6	N.S.	N.S.[h]	4	1	23	26	0	0	12	11

NOTES

a. Sources: Ken Witty and Willie Noll, Wallowa District, Duane West, La Grande District, and Paul Hirose, Clackamas Labs, Oregon Department of Fish and Wildlife (ODFW), personal communication; and Hirose, P., 1985. Northeast Oregon Spring Chinook and Steelhead Spawning Ground Surveys, ODFW Report No. 85-4.

Surveys are one-time peak counts usually made in the last week of August and the first week of September.

b. Index areas have been standardized since 1976. Earlier survey mileages varied. See footnotes below for specific changes.

c. Present index: Steel Bridge to O.C. Ranch (3.Ø mi.).
From 196Ø through 1974, index was 8.Ø miles and included two separate sections: Lapover Meadow to Williamson Campground and Steel Bridge to O.C. Ranch.
From 1974 through 1976, index was 6.5 miles and included three separate sections: Lapover Meadow to Bowman Trail, Walla Walla Campground to Williamson Campground, and Steel Bridge to O.C. Ranch.
Since 1976, index area has been 3.Ø miles.

The Lostine River is a tributary of the Wallowa River.

d. Present index: Elk Creek to Splash Dam (6.Ø mi.).
In 1964, 14.5 miles were surveyed.
In 1965 and 1966, 13.Ø miles were surveyed.
In 1967, 3.Ø miles were surveyed.

e. Present index: Salmon Hole to mouth of the Little Minam (6.Ø mi.).
Index area has remained constant from 196Ø through the present.

f. Present index: Little Minam Falls downstream 1.5 miles (1.5 mi.)
Index area has remained constant from 196Ø through the present.

g. Present index: Summer Creek to Little Lookingglass Creek (6.2 mi.).
Index area has remained constant from 196Ø through 1984.

h. In 1981, 1982, and 1983, fish taken at the trap for Lookingglass Hatchery egg supply reduced redd counts in this index.
Redd counting in this index area was discontinued in 1984.

i. Present index: The confluence of the South Fork and the mainstem of Catherine Creek upstream 2.Ø miles (2.Ø mi.)
Index area has remained constant from 1967 through the present.

j. Present index: The confluence of the Middle Fork and the North Fork of Catherine Creek to the confleunce of the North Fork and the mainstem of Catherine Creek. (3.Ø mi.)
Index area has remained constant from 1967 through the present.

k. Present index: The confluence of the North Fork and the mainstem of Catherine Creek to Badger Flat Bridge (7.5 mi.).
Before 1976, surveys conducted on Catherine Creek by the Oregon Game Commission included 14.Ø miles of lower Catherine Creek (confluence of North and South Fork to town of Union).
Redd counts listed on above chart corrrespond to present index (7.5 mi.).

l. Present index: Mouth of the East Fork to Concrete Bridge (8.5 mi.).
Before 1965, index area mileage is unknown.
In 1966, index area mileage was 7.5 mi.
In 1967, index area mileage is unknown. However, 216 redds were counted in 18.Ø miles.
In 1968, index area mileage was 21.Ø mi.

m. Present index: Dorrance Road to Hatchery (4.Ø mi.).
Index area has remained constant from 1963 through the present.

n. Present index: Dorrance Road to Mouth (5.Ø mi.).
Index area has remained constant from 1963 through the present.

o. Present index: Confluence of the North and South Forks to 6.Ø miles downstream (6.Ø mi.).
Index area has remained constant from 1963 through present.

p. Present index: Bear Creek Guard Station to bridge (7.Ø mi.)
Index area has remained constant from 1964 through present.

Bear Creek is a tributary of the Wallowa River.

SUMMER STEELHEAD REDD COUNTS IN THE GRAND RONDE BASIN[a]

Index stream mileage is in parentheses[b]

SPAWNING YEAR	MEADOW CR.[c] (7.0)	FIVE POINTS CR.[d] (6.0)	PHILLIPS CR.[e] (2.5)	MC COY CR.[f] (2.0)	FLY CR.[g] (4.0)	WALLOWA R.[h] (5.0)	ELK CR.[i] (10.0)	SPRING CR.[j] (1.0)	HAYS FORK CR.[l] (1.0)	SWAMP CR.[h] (6.0)
1967	57°	18°	14	31°	39	90	204	26	28	52
1968	6°	29	3°	6°	26	44	52	24	0	13
1969	21	31	11	11	8	83	100	11	4	39
1970	11	7	7	6	7	54	116	15	12	13
1971	8	22	6	15	6	22	28	15	12	22
1972	16	17	3	5	8	53	21	24	15	70
1973	19	53	11	16	10	22	6	7	13	20
1974	6	8	2	0	7	29	20	14	13	28
1975	5	5	4	3	0	44	5	24	16	6
1976	4	0	3	0	2	24	9	6	10	3
1977	6	27	5	1	22	14	3	8	11	7
1978	7	16	10	2	12	15	0	12	12	15
1979	0	0	1	1	0	9	2	4	3	0
1980	27	26	14	1	6	12	29	16	0	43
1981	0	9	3	0	4	29	16	24	0	12
1982	1	16	2	0	4	36	18	18	4	15
1983	15	16	2	3	6	25	20	3[k]	6	3
1984	N.S.[n]	3[n]	N.S.[n]	N.S.[n]	N.S.[n]	16	20	16[k]	11	7

NOTES

a. Sources: Ken Witty and Willie Noll, Wallowa District, and Duane West, La Grande District, Oregon Department of Fish and Wildlife (ODFW), personal communications; James, G. 1984, Grand Ronde River Basin, Recommended Salmon and Steelhead Habitat Improvement Measures, prepared by the Confederated Tribes of the Umatilla Indian Reservation; and Hirose, P. 1979. Northeastern Oregon Spring Chinook and Summer Steelhead Spawning Ground Surveys for 1979, ODFW Information Report No. 80-1.

Redd counts reported here begin with 1967 surveys because of the large variations in index area mileage in earlier surveys.

For earlier data, and for information relating summer steelhead reddscounted to index miles surveyed, refer to companion chart entitled 'Summer Steelhead Redd Counts and Redd Densities in the Grande Ronde Basin'.

b. Index areas have varied considerably because of unpredictable flow and visibility conditions during steelhead spawning season. An attempt has been made to note the changes for each index area. See footnotes below.

Also, see separate chart entitled 'Summer Steelhead Redd Counts and Redd Densities in the Grand Ronde Basin.'

c. Present index: Smith Creek to concrete bridge.
Index area has remained constant from 1967 through the present.

d. Present index: Camp 4 crossing to railroad bridge.
Index area has remained constant from 1967 through the present.

e. Present index: Forest Boundary to Tollgate Highway.
Index area has remained constant from 1967 through the present.

f. Present index: Wooden Bridge to road crossing 2.0 mi. downstream.
Index area has remained constant from 1967 through the present.

g. Present index: Fly Meadows Bridge to 4.0 miles upstream.
Index area has remained constant from 1967 through the present.

h. Present index: Joseph to Enterprise (some stretches not counted).
Index has remained constant from 1967 through the present.

i. Present index: Weaver Ranch to mouth.
Index area has remained constant from 1967 through the present.
Elk Creek is a tributary of Joseph Creek.

j. Present index: One mile above Wallowa Hatchery to Hatchery.
Index area has remained constant from 1967 through the present.

Spring Creek is a tributary of the Wallowa River.

k. Fish trap installed above index. Hatchery adult returns and smolt releases have occurred in this index beginning in 1983.

Natural production (and redd counts) is mostly from hatchery strays.

l. Present index: Headwaters to confluence with Prairie Creek.
Index area has remained constant from 1967 through the present.
Hay's Fork is a tributary of the Wallowa River.

m. Present index: One mile below Beaver Creek to Charolais Road.

From 1966-71,	index area was	6.Ø miles.
From 1972-73,	index area was	8.Ø miles.
In 1974,	index area was	12.Ø miles.
From 1975-78,	index area was	6.Ø miles.
From 1978-present,	index area was	5.Ø miles.

Swamp Creek is a tributary of Joseph Creek.

n. High water, poor visibility. Inaccurate surveys.

o. Survey mileage varied during these years. Therefore, redd counts reported were mathematically adjusted (by ODFW) to correspond to standard index areas used in later surveys. Redd densities were calculated and factored by mileage of index areas used in later surveys.

Actual redd counts for the years noted are listed below:

Index	Year	Mileage	Redds	Redds/mile
Meadow Cr.	1967	1Ø.Ø	82	8.2
	1968	2.5	2	.8
Five Pts. Cr.	1967	15.Ø	44	2.9
Phillips Cr.	1968	5.Ø	5	1.Ø
McCoy Cr.	1967	11.Ø	173	15.7
	1968	3.75	11	2.9
Fly Cr.	1968	2.Ø	13	6.5

SUMMER STEELHEAD REDD COUNTS AND REDD DENSITIES IN THE GRAND RONDE BASIN[a]

SPAWNING YEAR	MILES SURVEYED[b]	REDDS	REDDS/MILE
1964	113	331	2.9
1965	175	636	3.6
1966	247	2168	8.8
1967	161	1404	8.7
1968	155	543	3.5
1969	158	610	3.9
1970	151	533	3.5
1971	146	388	2.7
1972	131	490	3.7
1973	148	463	3.2
1974	112	265	2.4
1975	86	147	1.8
1976	84	66	0.8
1977	83	210	2.5
1978	110	173	1.6
1979	109	31	0.3
1980	117	275	2.4
1981	100	183	1.8
1982	89	169	1.9
1983	99	157	1.6
1984[c]	63[c]	138[c]	2.2[c]
1985	91	792	8.7

NOTES

a. Source: Annual Report, 1984. Oregon Department of Fish and Wildlife (ODFW), Wallowa District; and Hirose, P. 1979. Northeastern Oregon Spring Chinook and Summer Steelhead Spawning Ground Surveys for 1979, ODFW Information Report No. 80-1.

Redd densities rather than actual index redd counts are reported here because of annual inconsistencies in index area mileage surveyed due to the variability in flow and visibility conditions during steelhead spawning season. Index counts are, therefore, incomparable from year to year.

For actual index redd counts, refer to chart entitled 'Summer Steelhead Redd Counts in the Grand Ronde Basin'.

b. Includes standard and supplemental index areas.

c. Wallowa District streams only.

COHO REDD COUNTS IN THE WALLOWA RIVER[a,b]

Index Stream Mileage Surveyed is in Parentheses

SPAWNING YEAR	WALLOWA R.[c] (5.0)	PRARIE CR.[d] (2.0)	SPRING CR.[e] (2.0)	LOSTINE R.[f] (3.0)
1968	51	2	6	Ø
1969	35	Ø	4	3
1970	76	6	3	3
1971	107	Ø	3	7
1972	43	2	2	4
1973	70	1	6	Ø
1974	27	Ø	3	Ø
1975	12	Ø	N.S.	Ø
1976	64	Ø	7	Ø
1977	4	1	Ø	Ø
1978	3	Ø	Ø	Ø
1979	7	Ø	Ø	Ø
1980	4	Ø	Ø	Ø
1981	Ø	Ø	Ø	Ø
1982	N.S.	N.S.	N.S.	N.S.
1983[b]	4	N.S.	N.S.	N.S.
1984[b]	N.S.	N.S.	N.S.	N.S.

NOTES

a. Source: Ken Witty and Willie Noll, Wallowa District, Oregon Department of Fish and Wildlife (ODFW), personal communications.

b. From 1964 through 1967, ODFW released 300 coho adults, from Bonneville Hatchery stocks, and 267,500 fry, from lower Columbia River stocks, in the Wallowa River.

In 1983 and 1984, an attempt was made to develop a hatchery outplant program using coho stocks then present in the Wallowa River. The program was discontinued because the number of fish trapped at Ice Harbor Dam was too small for successful egg collection.

c. Present index: Dorrance Road to Hatchery.
Index area has remained constant from 1968 through present.

d. Present index: Hays Fork.
Index area has remained constant from 1968 through present.

e. Present index: Hatchery to Mouth.
Index area has remained constant from 1968 through present.

f. Present index: O.C. Ranch to County Bridge.
Index area has remained constant from 1968 through present.

IMNAHA RIVER

SPRING AND SUMMER CHINOOK REDD COUNTS IN THE IMNAHA BASIN[a]

Index Stream Mileage is in Parentheses[b]

SPAWNING YEAR	Imnaha R. BLUE HOLE TO INDIAN CROSSING (2.3)	Imnaha R. INDIAN CROSSING TO MAC'S MINE (7.7)	BIG SHEEP CR.[d] (4.0)	LICK CR.[f] (4.0)
1960	48	275	N.S.	N.S.
1961	39	182	N.S.	N.S.
1962	41	207	N.S.	N.S.
1963	30	103	N.S.	N.S.
1964	20	230	34[e]	14
1965	15	174	26	25
1966	20	203	61	47
1967	35	180	30	30
1968	13	228	36	34
1969	61	241	30	4
1970	53	123	55	50
1971	61	305	57	13
1972	49	287	28	27
1973	93	427	31	16
1974	61	216	8	12
1975	28	121	14	11
1976	24	103	24	17
1977	N.S.	143	5	5
1978	96	319	14	32
1979	31	52	0	4
1980	7	33	0	4
1981	17	82	2	2
1982	37	92[c]	9	0
1983	24	71[c]	11	0
1984	43	76[c]	7	2

NOTES

a. Sources: Ken Witty and Gary Anderson, Oregon Department of Fish and Wildlife (ODFW) Wallowa District, personal communications; ODFW, Wallowa District Annual Reports; and Hirose, P. 1980. Northeastern Oregon Spring Chinook and Summer Steelhead Spawning Ground Surveys for 1979. ODFW Information Report No. 80-1.

Spring and summer chinook redds are counted together. Surveys are one time peak counts and are made in late August

b. Except where otherwise indicated. See footnotes below.

c. Since 1982, this index has been affected by trapping for Lookinglass Hatchery. The percentage of fish trapped that would have spawned in the index area cannot be determined because the trap is located well below the lower end of the index boundary.

Beginning in 1984, smolts have been outplanted into the Imnaha River index area. Outplanting programs are planned for other sections of the Imnaha basin in the near future.

d. Present index: Lick Creek Road to Echo Canyon (4.0 mi.).
Index area has remained constant form 1960 through the present.

e. In 1964, two index areas were surveyed:
1. Lick Creek Road to Echo Canyon---34 redds.
2. Coyote Creek to Griffith Creek--- 6 redds.

f. Present index: Lick Creek Road to confluence with Big Sheep Creek (4.0 mi.).
Index area has remained constant from 1960 through the present.

SUMMER STEELHEAD REDD COUNTS IN THE IMNAHA BASIN[a]

Index Stream Mileage is in Parentheses[b]

SPAWNING YEAR	CAMP CR.[c] (6.0)
1965	24[d]
1966	108
1967	108
1968	11
1969	24
1970	46
1971	63
1972	10
1973	6
1974	14
1975	4
1976	1
1977	6
1978	11
1979	16
1980	34
1981	9
1982	7
1983	17
1984	14
1985	39

NOTES

a. Sources: Ken Witty, Oregon Department of Fish and Wildlife (ODFW), personal communications; James, G. 1984, Imnaha River Basin, Recommended Salmon and Steelhead Improvement Measures, Confederated Tribes of the Umatilla Indian Reservation; and Hirose, P. 1979. Northeastern Oregon Spring Chinook and Summer Steelhead Spawning Ground Surveys for 1979, ODFW Information Report No. 80-1.

b. Unless noted otherwise. See below.

c. Present index: The lower 6.0 mi. of Camp Creek.
Index area has remained constant from 1966 through the present.

Camp Creek is a tributary of Big Sheep Creek.

d. In 1965, index area was 3.0 mi.

SALMON RIVER

SPRING CHINOOK REDD COUNTS IN THE SALMON RIVER BASIN[a]

Index stream mileage surveyed is in parentheses[b]

	MAIN					E. FK.		N.FK.	MIDDLE FK.				
SPAWNING YEAR	ALTURAS LAKE CR.[c] (4.5)	UPPER SALMON R.[e] (24.75)	UPPER VALLEY CR.[f] (11.25)	UPPER YANKEE FK.[g] (9.0)	LEMHI R.[h] (12.0)[h]	UPPER E. FK.[j] (10.0)[j]	HERD CR. (5.0)	N. FK. (14.25)	BEAR VALLEY CR.[k] (27.0)	ELK CR.[m] (10.0)	SULPHUR CR.[o] (3.0)	UPPER BIG CR.[p] (4.5)	MARSH CR. DRAINAGE[q] (15.0)
1960	33	720	83	43	1434[i]	122	N.S.	N.S.	386	346	79	159	316
1961	30	813	227	192	1871[i]	818	N.S.	N.S.	675	384	239	382	546
1962	138	638	157	60	1455[i]	334	N.S.	N.S.	484	426	169	231	345
1963	86	638	141	128	364[i]	646	N.S.	N.S.	460[l]	654[n]	332	181	372
1964	80	706	199	146	1151[i]	405	N.S.	N.S.	576[l]	425[n]	97	51	709
1966	119	699	219	112	819[i]	511	N.S.	N.S.	534	525	142	127	406
1967	74	943	253	250	804[i]	614	N.S.	N.S.	445	420	134	67	650
1968	110	637	330	234	589[i]	622	N.S.	N.S.	574	483	142	90	466
1969	41	313	350	53	360[i]	174	N.S.	N.S.	356	349	138	90	235
1970	68	432	202	67	371[i]	468	N.S.	N.S.	334	302	93	N.S.	456
1971	50	619	89	89	407	370	N.S.	N.S.	108	173	58	32	281
1972	143	748	182	115	507	448	N.S.	N.S.	221	212	71	60	312
1973	153	414	125	104	485	665	47	55	387	369	78	96	518
1974	42	338	127	54	215	346	13	18	130	108	30	28	210
1975	60	509	189	60	366	348	11	14	215	169	50	77	201
1976	16	378	N.S.	40	241	75	27	6	76	61	14	22	48
1977	85	698	18	6	474	168	6	31	129	86	5	9	98
1978	303	1707	141	33	796	841	26	29	184	208	64	95	270
1979	29	205	25	18	154	57	2	N.S.	69	49	15	15	47
1980	7	47[d]	6	0	47	7	0	N.S.	15	8	2	4	9
1981	4[d]	363[d]	2	16	126	76	9	N.S.	60	23	7	22	63
1982	9[d]	42[d]	1	0	163	28	1	N.S.	39	9	3	7	40
1983	27[d]	161[d]	8	0	50	121[j]	7	N.S.	56	38	8	27	33
1984	3[d]	76[d]	6	N.S	35	N.S.	0	N.S.	55	27	0	42	60

NOTES

a. Sources: Mel Reingold and Don Anderson, Idaho Department of Fish and Game (IDFG), personal communications; Pollard, H. 1983. Salmon Spawning Ground Surveys, Study II, Job No. I, IDFG Project F-73-R-5; and Ball, K. 1983. Stream Mile Estimates, Salmon River Spawning Ground Surveys, IDFG, unpublished memo.

Surveys are one-time peak counts usually made between the last week of August and the first week of September.

Since 1981, most surveys (except Marsh Creek Drainage, Big and parts of Sulphur Creek) have been made from helicopter and fixed wing aircraft.

b. Index areas have remained relatively constant over the past 25 years except where otherwise noted. IDFG intends to make some index area adjustments in 1985.

c. Present index: Lower Bridge to mouth (4.5 mi.).
Index area has remained constant from 1960 through the present.

d. These counts have been reduced since installation of weir in 1980. Approximately 2/3 of the run is taken at weir for Sawtooth Hatchery broodstock. The remainder of the run is allowed to pass weir and spawn naturally.

e. Present index: Breckenridge Diversion to Alturas Lake Creek (24.75 mi.).
Index area has remained constant from 1960 through the present.

f. Present index: Stanley Lake Creek to Trap Creek (11.25 mi.)
Index area has remained constant from 1960 through the present.

g. Present index: MacKay Creek to Jordan Creek (9.0 mi.).
Index area has remained constant from 1960 through the present.

h. Present index: Lemhi to Leadore (12.0 mi.).
Before 1978, index area was Leadore to Salmon City (55.5 mi.). Index was reduced after many years of very low counts in extended area.

i. Counts from 1960 through 1970 may have been reduced because of trapping near the mouth of the Lemhi River for hatchery programs.

j. Present index: Bowery Guard Station to 3.5 mi. below Boulder Creek (10.0 mi.).
Before 1983, index area was 21.0 miles.

k. Present index: Porter Brothers Dredge to mouth of Fir Creek (27.0 mi.).
Index area has remained constant from 1960 through the present.

l. Counts in 1963 and 1964 were reduced in Bear Valley Creek because of trapping for hatchery outplant programs.

m. Present index: Mouth of the West Fork Elk Creek to the confluence with Bear Valley Creek (mouth) (10.0 mi.).
Index area has remained constant from 1960 through the present.

The lower section (Twin Bridge to mouth) of this index has historically been surveyed by air and the upper section on foot.

n. Counts in 1963 and 1964 were reduced in Elk Creek because of trapping for hatchery outplant programs.

o. Present index: Sulphur Creek Ranch to 3.0 mi. downstream (3.0 mi.).
Index area has remained constant from 1960 through the present.

p. Present index: Jacob's Ladder Creek to Logan Creek (4.5 mi.).
Index area has remained constant from 1960 through the present.

q. Includes Beaver, Knapp, Cape Horn, and Marsh Creeks.

SUMMER CHINOOK REDD COUNTS IN THE SALMON RIVER BASIN[a]

Index stream mileage surveyed is in parentheses[b]

SPAWNING YEAR	MAIN		E. FORK	MID. FK.	SOUTH FORK		
	LOWER SALMON R.[c] (25.0)	LOWER VALLEY CR.[d] (8.25)	LOWER EAST FORK[e] (21.0)	LOON CR. (25.0)	S. FORK SALMON R.[f] (35.0)	JOHNSON CR. (3.0)	SECESH R.-LAKE CR.[i] (9.0)
1960	818	141	303	334	2290	505	332
1961	356	162	198	131	1058	207	135
1962	467	115	195	157	1589	297	169
1963	195	50	265	261	1057	266	163
1964	415	71	306	361	1124	310	181
1965	201	57	131	166	656	116	134
1966	390	184	216	49	980	110	140
1967	365	79	234	96	902	286	140
1968	223	63	235	135	515	127	58
1969	120	22	138	110	636	273	104
1970	150	41	123	43	527	130	63
1971	220	147	149	79	421	183	80
1972	412	39	161	151	577	220	87
1973	224	77	138	78	586	271	74
1974	200	45	49	47	218	107	21
1975	45	80	38	32	238	69	10
1976	44	43	39	31	241	68	17
1977	94	63	136	62	226	81	27
1978	349	219	N.S.	29	251	113	91
1979	N.S.	15	33	N.S.	115	36	20
1980	11	4	0	9	116[g]	24	20
1981	75	17	43	30	126[g]	45	53
1982	39	8	19	23	111[g]	37	65
1983	111	28	27	7	185[g]	63	98[j]
1984	89	15	16	N.S.	165	17	21[j]

NOTES

a. Sources: Mel Reingold and Don Anderson, Idaho Department of Fish and Game (IDFG), personal communications; Pollard, H. 1982. Salmon Spawning Ground Surveys, Study II, Job No. I, IDFG Project F-73-R-5; and Ball, K. 1983. Stream Mile Estimates, Salmon River Spawning Ground Surveys, IDFG, unpublished memo.

Surveys are one-time peak counts. Since 1975, most surveys have been made from fixed wing aircraft (See note "i" for exception).

b. Except where otherwise noted.

c. Present index: East Fork to Redfish Lake Creek (25.0 mi.). Before 1978, index area was 87.0 mi. Index was reduced after many years of very low counts in the extended area.

d. Present index: Stanley Lake Creek to mouth (8.25). Index area has remained constant from 1960 through the present.

e. Present index: Lower section from the weir to mouth (21.0 mi.).
Before 1983, entire East Fork was counted (33.0 mi.).

f. Present index: Mouth of Rice Creek to confluence of the East Fork of the South Fork of the Salmon River (35.0 mi.). Index area has remained constant from 1960 through the present.

g. Since 1980, counts have been reduced by trapping of 2/3 of run for McCall Hatchery egg supply. One-third of run is usually allowed past weir to spawn naturally.

h. Present index: Mouth of Moose Creek to Ice Hole (3.0 mi.) Index area has remained constant from 1960 through the present.

i. Present index: Includes two different areas -- Secesh Meadows and Lake Creek.
   1) Secesh Meadows: Forest Service boundary to Long Gulch Bridge (3.5 mi.).
   2) Lake Creek: Willow Creek to confluence of Summit Creek (before 1982, 9.0 miles; since 1982, 5.5 mi.).

   Lake Creek section counted on foot.

j. In 1984, only Secesh Meadows portion counted.

CLEARWATER RIVER

SPRING CHINOOK SALMON REDD COUNTS IN THE CLEARWATER RIVER BASIN[a]

Index stream mileage is in parentheses[b]

	SELWAY DRAINAGE[c]					LOCHSA[c]		SOUTH FORK DRAINAGE[c]			
SPAWNING YEAR	SELWAY R.[d] (44.0)	BEAR CR.[e] (5.0)	RUNNING CR.[f] (3.0)	WHITECAP CR.[g] (9.0)	MOOSE CR.[h] (12.0)	CROOKED FK.[i] (12.0)	BRUSHY FK.[j] (8.0)	NEWSOME CR.[k] (7.0)	CROOKED R.[l] (8.0)	RED R.[m] (14.0)[m]	AMERICAN R.[n] (7.0)
1972	175	25	11	8	13	32	N.S.	N.S.	N.S.	N.S.	N.S.
1973	261	26	21	7	32	60	N.S.	N.S.	N.S.	N.S.	N.S.
1974	66	10	4	2	15	22	6	3	22	12	N.S.
1975	21	5	0	1	4	6	4	10	6	20	N.S.
1976	58	14	3	4	15	36	13	3	36	15	N.S.
1977	97	18	2	1	23	51	15	9	51	50	N.S.
1978	125	13	6	N.S.	17	37	25	14	37	52	N.S.
1979	21	3	0	2	4	6	12	6	6	20	N.S.
1980	40	7	1	3	4	16	10	5	8	38	7
1981	47	8	N.S.	4	6	27	25	3	3	80	12
1982	38	8	N.S.	3	5	34	17	5	2	159	21
1983	26	8	N.S.	4	6	7	6	7	12	193[m]	9
1984	30	6	N.S.	6	7	28	9	1	22	175[m]	N.S.

NOTES

a. Sources: Ron Lindland, Idaho Department of Fish and Game (IDFG), personal communication; 1982 Salmon Spawning Ground Surveys, Study II, Job IDFG Project No. F-73-R-4; Linland, R. 1984. Annual Closing Report, Clearwater River Development of Spring Chinook and Steelhead Stocks, Columbia River Fisheries Development Program; and Horner, N. and T. C. Bjornn. 1981. Status of Upper Columbia and Snake River Spring Chinook Salmon in Relation to the Endangered Species Act, Idaho Cooperative Fishery Research Unit, University of Idaho.

Redd counts were not made in the Clearwater basin until 1972.

Surveys are one-time peak counts. Most surveys are made from helicopter except in portions of the Crooked Fork, Brushy Fork, Newsome Creek, Crooked River and 2.0 miles of the Selway River which are surveyed on foot. Studies in the Clearwater basin indicate that in years of good visibility helicopter surveys identify approximately 80% of the redds that would be counted in foot surveys (Linland, personal communication).

b. Except where otherwise noted. See note 'm'.

c. Since 1961, approximately 50 million spring chinook eyed eggs were transplanted and 15 million fry, fingerlings and smolts have been released in the Clearwater drainage.

In the Selway drainage, the location of these plants has been the Indian Creek, Bear Creek, Running Creek, and Ditch Creek incubation channels and other portions of the mainstem Selway River. In the South Fork drainage, plants have been made in the Crooked and Red Rivers, Newsome, and Ten Mile Creeks and in the mainstem of the South Fork. The Lochsa drainage has received plants in the mainstem Lochsa River. Outplants have also been made in Clear and Lolo Creeks and in other portions of the mainstem Clearwater River.

Sources of eyed eggs has been Bonneville Dam trap, the Salmon River, Cowlitz, Carson, and Rapid River Hatcheries. Pre-smolts and smolts have been supplied by Rapid River, Kooskia (originally from South Santiam, Levenworth, and Little White Salmon Hatcheries), Sandpoint, and Mckay Hatcheries.

d. Present index: Bear Creek to Thompson Flat (44.0 mi.).
The Little Clearwater to Macgruder Crossing section is surveyed on foot.
Index area has remained constant from 1972 through the present.

e. Present index: Cub Creek to mouth (5.Ø mi.).
Index area has remained constant from 1972 through the present.

f. Present index: Eagle Creek to mouth (3.Ø mi.).
Index area has remained constant from 1972 through the present.

g. Present index: Cooper's Flat to mouth (9.Ø mi.).
Index area has remained constant from 1972 through the present.

h. Present index: Three miles above Elbow Bend to mouth (12.Ø mi.).
Index area has remained constant from 1972 through the present.

i. Present index: Boulder Creek to mouth (12.Ø mi.).
The Cliffhole to Rock Creek section is surveyed on foot.
Index area has remained constant from 1972 through the present.

j. Present index: Lower Gap to mouth (8.Ø mi.).
Index area has remained constant from 1972 through the present.

k. Present index: Old Newsome Townsite to mouth (7.Ø mi.).
The Beaver Creek to Nuggett Creek section is done on foot.
Index area has remained constant from 1972 through the present.

l. Present index: Orogrande Lodge to Narrows (8.Ø mi.).
The upper end of airport to Relief Creek section is done on foot.
Index area has remained constant from 1972 through the present.

m. Present index: Cole 66 Bridge to Red River Ranger Station (9.Ø mi.), and Otterson Creek (5.Ø mi.). Total mileage = 14.Ø mi.
Before 198Ø, index: Cole 66 Bridge to Red River Ranger Station (9.Ø mi.).
The Moose Butte Bridge to Blanco Road section (lying within the "Cole 66 Bridge to Red River Ranger Station" index) is surveyed on foot.

A hatchery program (Red River Rearing Ponds) operates in this index. Adults were trapped for egg take in 1983 and 1984. For more information on this program, see note 'c'.

n. Present index: Mane's Ranch to Johnson Dredge (7.Ø mi.).
Index area has remained constant from 198Ø through the present.
The Idaho Department of Fish and Game began surveys in this index in 198Ø.